4

APPLICATION OPERATION

4.1 FOR OBTAINING BETTER IMAGES

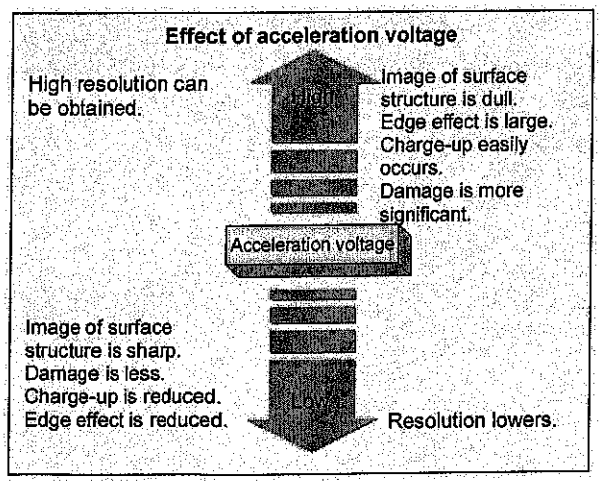
For observing specimens, most adequate values must be selected for various conditional parameters such as acceleration voltage, irradiation current, movable aperture, and working distance.
Also a sampling method (preparation of specimens) and specimen tilt must be considered. In addition, adjustments of luminance, astigma and focus are important for obtaining best image quality.

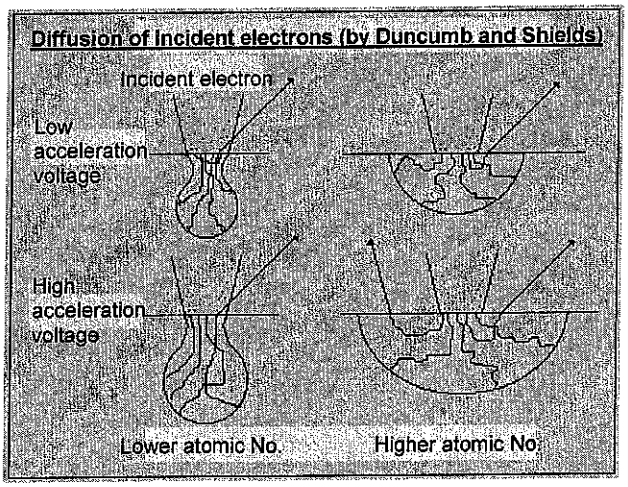
4.1.1 Difference of image quality due to the level of acceleration voltage

The higher the acceleration voltage, the thinner the electronic probe diameter, provided that only electronic probe diameter is theoretically taken into account; however, drawbacks appearing when using a high acceleration voltage cannot be disregarded. Some main points thereof are listed below:

a. The fine structure of the specimen surface is susceptible to damage.
b. Edge effect becomes significant.
c. Charge-up tends to easily occur.
d. Specimen damage tends to easily occur.

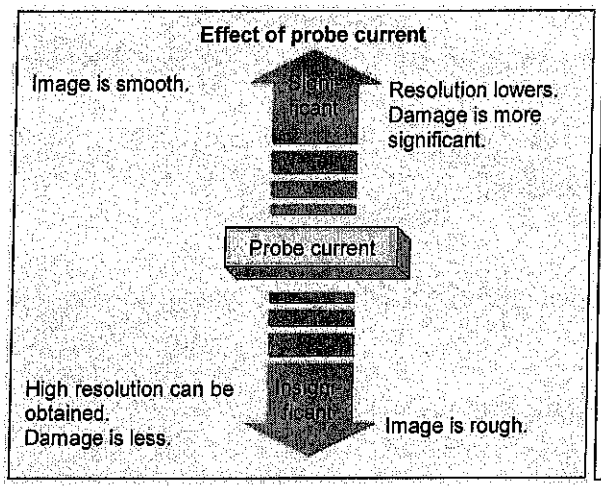
Generally, operation at low acceleration voltages results in fine structures more significantly appearing on the specimen surface. At high voltages, the entry/diffusion area of the electron beam in the specimen is larger, and accordingly unnecessary signals (e.g., reflected electrons) occurring from inside the specimen deteriorate the contrast, thereby causing the fine structure on the specimen surface to be invisible. Thus, low acceleration voltages are particularly preferred for observing low-density substances.





4.1.2 Effect of probe current

As the diameter of the electronic probe irradiating a specimen is smaller, the higher magnification ratio and resolution of SEM can be obtained. However, under such conditions, the smoothness of an image, i.e., the S/N (signal/noise) ratio of the image, depends on the current irradiated to the specimen. The smaller the irradiation current, the smaller the electron beam probe diameter. Thus, selecting an irradiation current suitable for the specimen, magnification, and observation conditions (acceleration voltage, specimen tilt, etc.) is required.

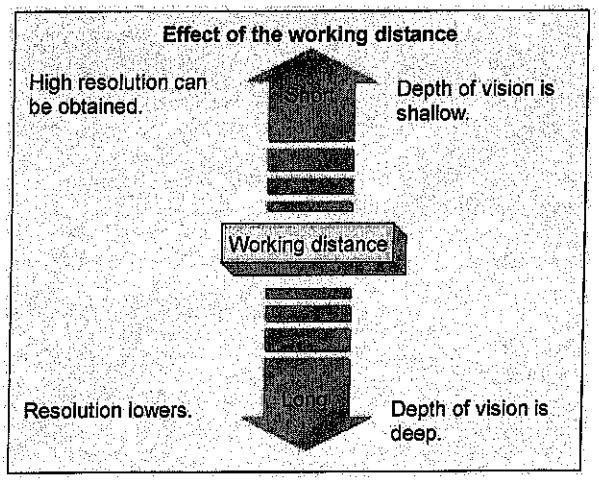


Indication of setting an probe current

P.C. value	[0]	⟷	[99.9]
Resolution	High	⟷	Low
Probe diameter	Small	⟷	Large
Probe current	Small	⟷	Large
Condenser lens current	Large	⟷	Small
Specimen damage	Insignificant	⟷	Significant
Image quality	Rough	⟷	Smooth

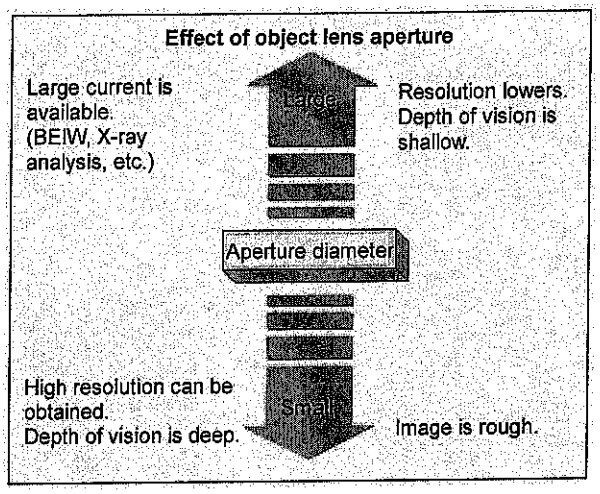
4.1.3 Effect of the working distance (WD) on images

Regarding the working distance (WD), high resolution with a small depth of vision is obtained at a short WD, and on the contrary a large depth of vision with low resolution is resulted at a long WD. Select most suitable observation conditions considering other factors such as sampling method and specimen tilt. In addition, adjusting luminance, astigmia and focus is also important for obtaining best images.



4.1.4 Effect on images by aperture diameter

The aperture (movable aperture) of the object lens set on this equipment as standard is configured by three stages: 20, 30 and 60 μmϕ. To obtain high resolution, a most suitable aperture diameter must be selected. However, the aperture diameter should not be adjusted small to a level more than necessary since a sufficient quantity of signals is required for forming an image on this equipment in addition to the thinness of electron beam. Select the following values for respective purposes of observation: 20 μmϕ for high-resolution observation, 30 μmϕ for normal observation or EDS analysis, and 60 μmϕ for WDS analysis, for example, where a large current is required.

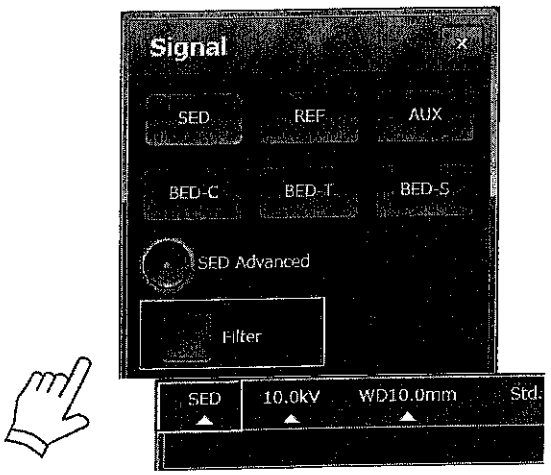


4.1.5 Relation between specimen tilt and emission electron

When electron beam is irradiated to a specimen, secondary electrons are emitted from relatively shallow locations. This happens because secondary electrons, which have low energy, cannot reach the specimen surface when they are produced in deep locations.

However, in portions of the specimen where it is tilted, primary electrons enter into a wide area at small angles, and thus secondary electrons produced inside the specimen easily reaches the surface, resulting in a large emission quantity of secondary electrons.

This phenomenon may cause only the tilted portion of the observed specimen to be displayed in white (called "halation"). To reduce halation, turn the tilted surface toward the opposite of the secondary electron detector (downward in the observation window). If still not enough, then a filter for secondary electrons is effective. With this filter, the quantity of signals is limited, offering more effective reduction of halation.



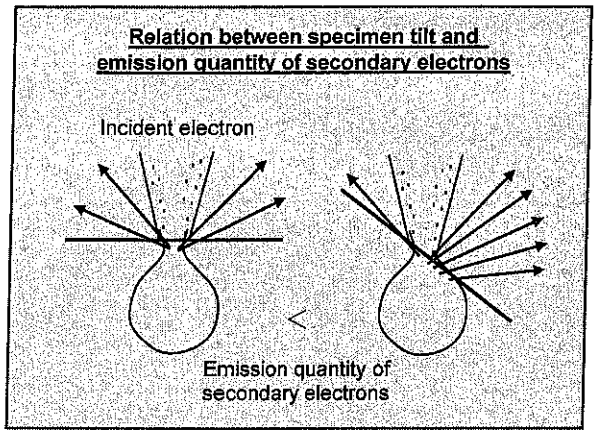
Tap △ of photo data/signal and check "Filter" in the Signal window.

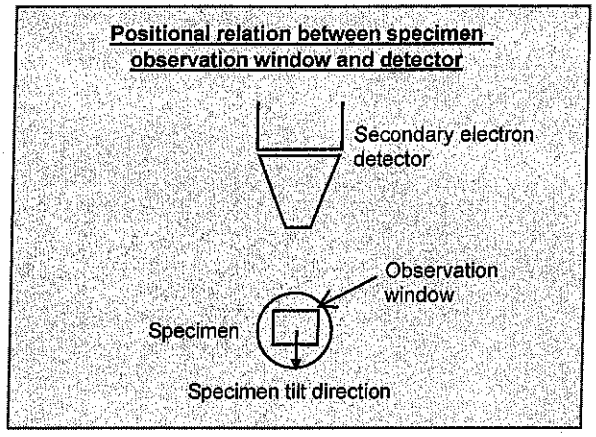
4.1.6 Observation and charge-up of nonconductive specimen

Charge-up may be observed when irradiating the electron beam to a nonconductive specimen at high acceleration voltages or with large probe current, where electrons are accumulated on the specimen surface. If this happens, shifts or variation in brightness of the obtained images might be resulted due to such effects as the track of primary electron beam being changed or the production of secondary electrons being constrained.

With this type of specimens, observation in reduced charge-up is possible through establishing a low acceleration voltage or low vacuum (LV) mode.

Moreover, charge-up can be reduced by tilting the specimen to increase emission electrons.



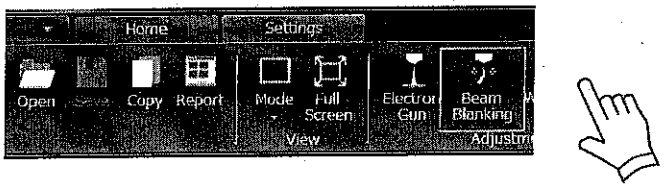


4.2 IMAGE OBSERVATION AND ASSOCIATED MATTER

4.2.1 Temporarily shutting off the electron beam

Temporarily shutting off the electron beam can prevent damage of the specimen.

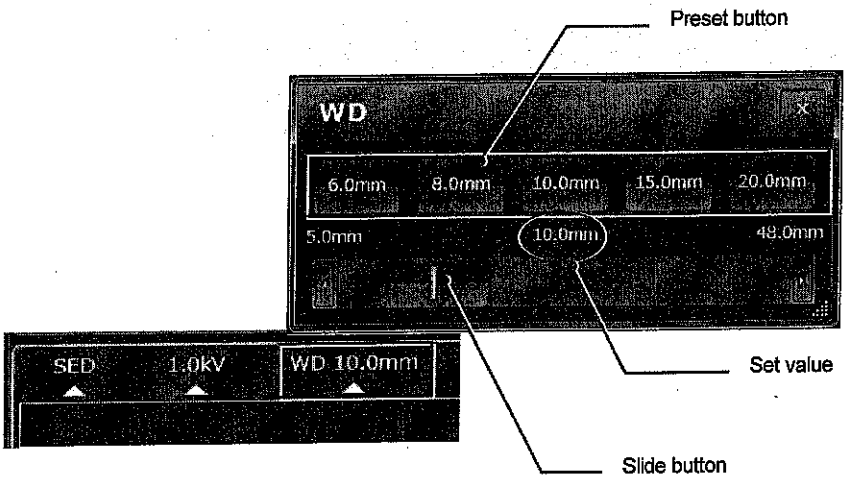
1. Tap the Beam Blanking icon from Home.
   The electron beam is shut off.
   To release the shutoff, tap the Beam Blanking icon again.



4.2.2 Matching the focus current to WD

Matching the focus current to the present WD offers a most suitable focus.

1. Tap △ mark under WD of the photo data.
   In the below figure, tap the △ mark under 『WD 10.0mm』, and WD window is displayed.
2. Set a WD.
   Tap the preset button or use the slide button for setting.
   The value set by using the slide button is displayed in the upper middle of the slide bar.



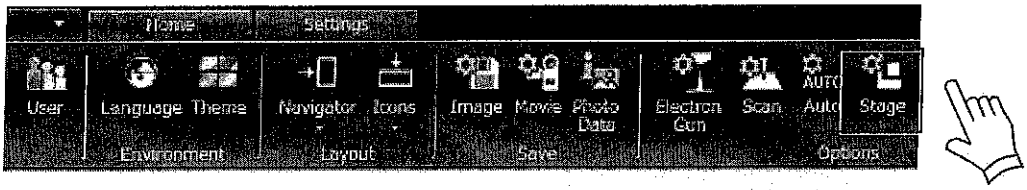
Changing the preset button

Drag the value selected by using the slide button (upper middle of the slide bar) and drop it on the preset button desired to change. The value of the preset button changes.

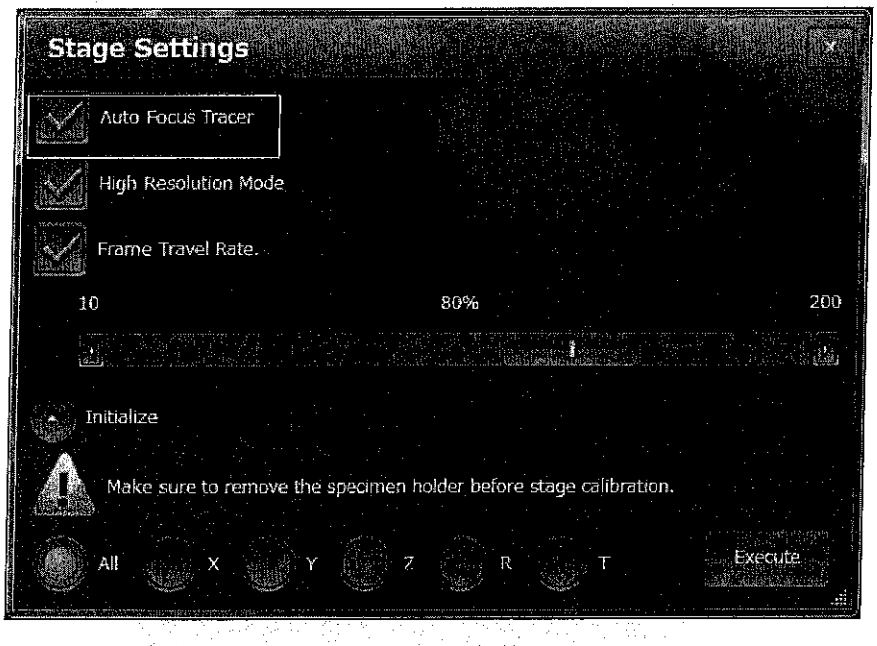
4.2.3 Making the focus follow Z-axis displacement

(Auto-focus tracer)
This function is for automatically, synchronously letting the focus follow the Z-axis displacement.

1. Tap the Stage icon from Settings.
   The Stage Settings window is displayed.



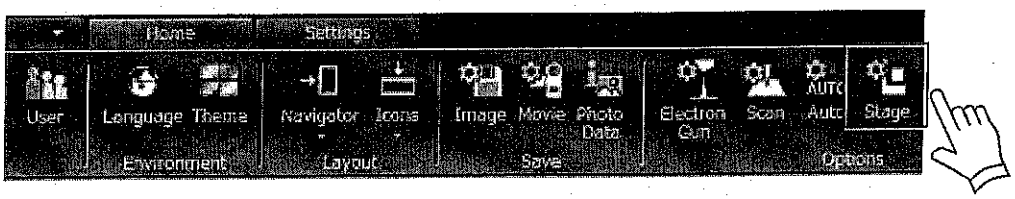
2. Check Auto Focus Tracer.



4.2.4 Observing at high resolution

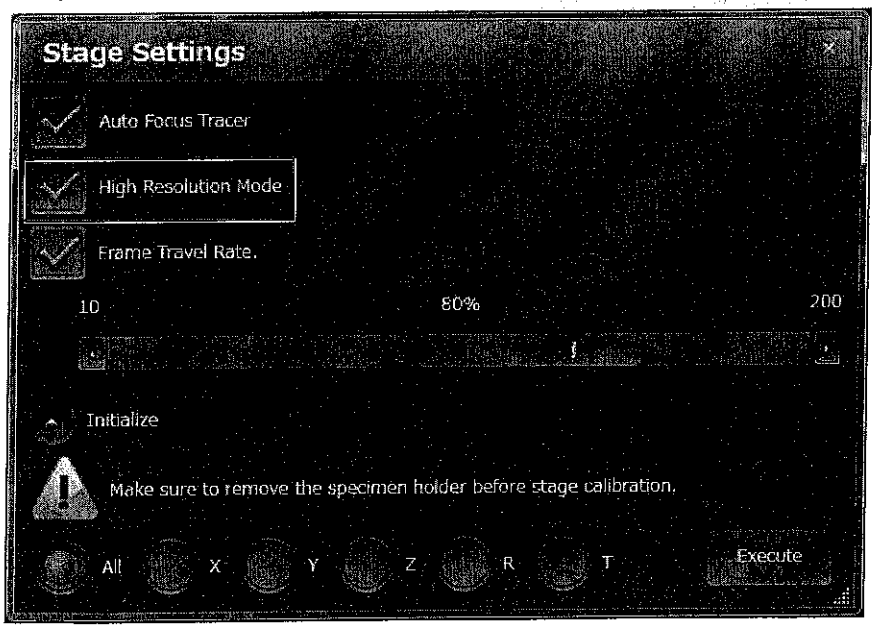
To establish high resolution, the WD must be shortened.
The WD is normally limited to 8 mm, but the following operation enables reducing the distance to as small as 5 mm:

1. Tap the Stage icon from Settings.
   The stage setting window is displayed.



2. Check High Resolution Mode.
   The stage can be displaced to as small as 5 mm WD.

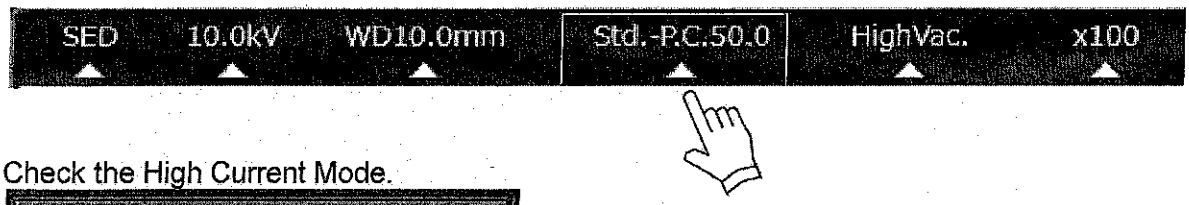
   Care must be taken that, if a wrong specimen height is set even though the specimen actually protrudes from the specimen holder, an accidental contact might occur with parts inside the specimen compartment, thereby damaging the parts. ⇒ See 3.6.



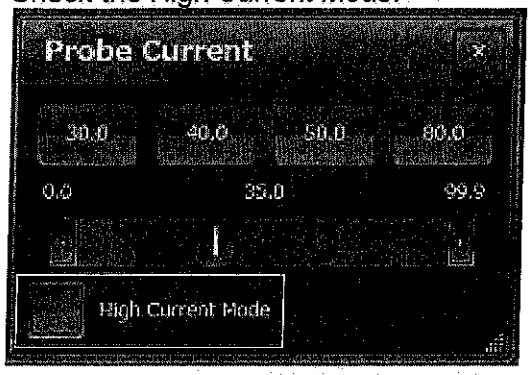
4.2.5 Irradiating large currents to a specimen

Use this function for the case requiring large currents, such as WDS analysis.

1. Tap △ mark under P.C. of the Photo data.
   In the below figure, tap the △ mark under『Std.-P.C.50.0』, and Probe Current window is displayed.



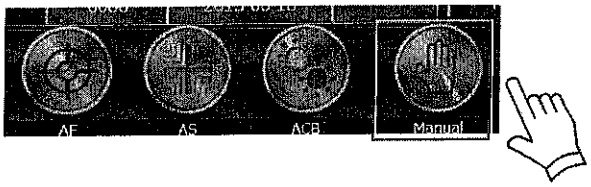
2. Check the High Current Mode.



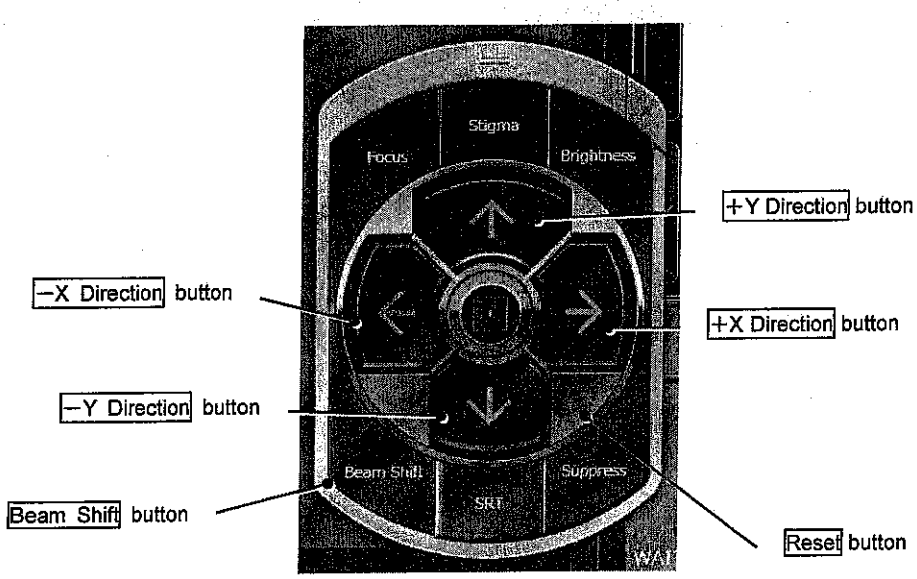
4.2.6 Displacing a target object at fine steps

(Beam shift)
Use this function for the high observation magnification of several thousands or more.

1. Tap the Manual icon.
   The manual adjustment tool is displayed.



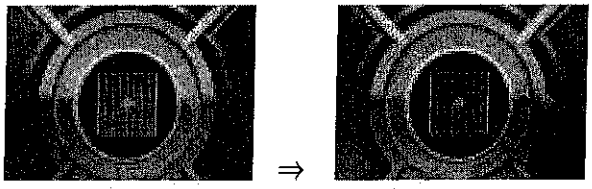
2. Tap the Beam Shift button.
3. Tap respective buttons to displace an image.
   Continuously pressing the buttons continuously displaces the image in the directions corresponding to the buttons.



(Beam shift reset)
Use this function for resetting the beam shift amount.

1. Tap the Manual icon and the Beam Shift button.
2. Tap the Reset button.
   The beam shift is reset.

There is a limit on displacement using the beam shift.
Upon reaching the displacement limit, no more displacement using the beam shift is possible.
The present amount of beam shift displacement can be identified with the location displayed on the indicator, which is positioned at the center of the manual adjustment tool.

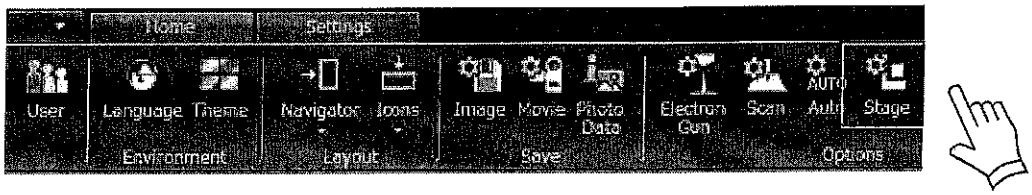


Example: When the beam shift reaches the limit in the direction of +X

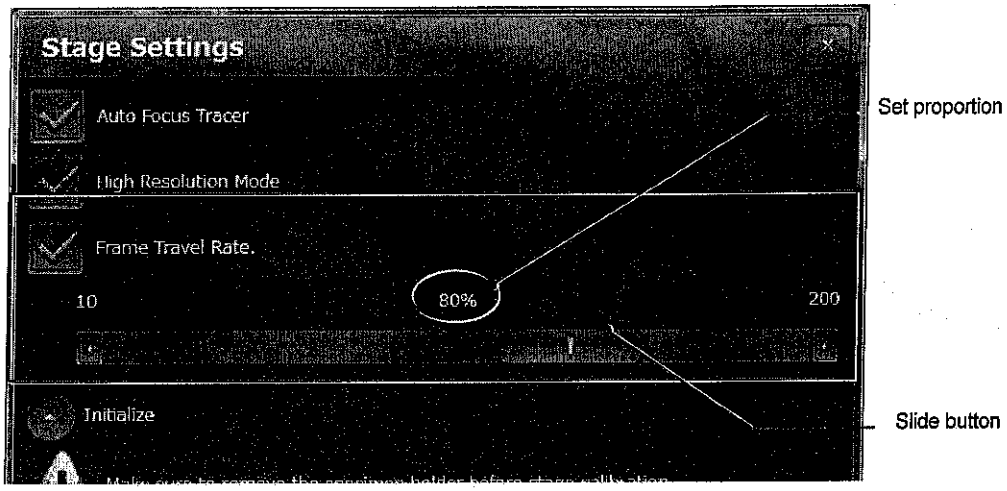
Upon reaching the displacement limit, reset the beam shift in the above-mentioned operation and conduct displacement again by using the stage.

4.2.7 Displacing an image as a frame

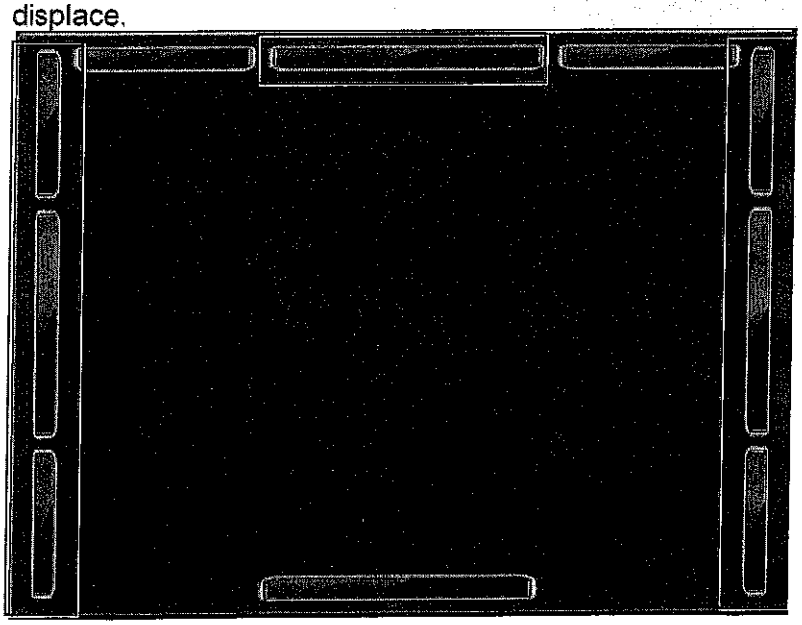
1. Tap the Stage icon from Settings.
   The Stage Settings window is displayed.



2. Check Frame Travel Rate and set a proportion by using the slide button.
   The set proportion is displayed in the upper middle of the slide bar.



3. In the main window, tap the stage displacement button corresponding to the direction desired to displace.



4. The image is displaced by a set percent value in the direction shown on the button.
   For example, setting a frame displacement amount of 50% makes displacement equivalent to half a frame and 100% makes that equivalent to a full frame (one image).

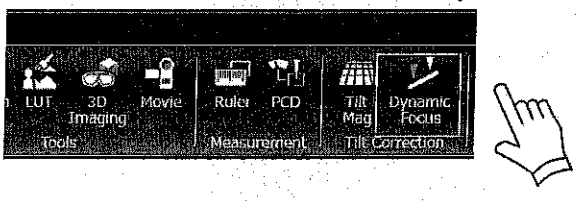
4.2.8 Correcting focus blur or magnification error due to stage tilt

4.2.8.a Correcting focus blur

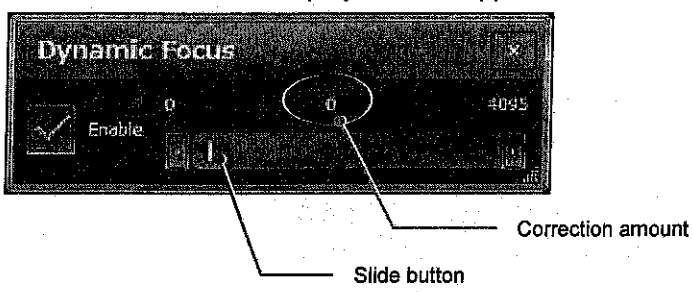
(Dynamic focus)
Focus blur occurs in the observation window when conducting observation by tilting the specimen stage T-axis.
Using the dynamic focus function enables correction of focus blur due to T-axis tilt.
Set the scan rotation angle to zero degree for correcting focus blur in the tilt direction of stage T-axis.

1. Adjust the focus at the center of the observation image.
   Before the focus adjustment, set the scan rotation angle to "0°."
   ⇒ See 4.2.9.

2. Tap the Dynamic Focus icon from Home.
   The Dynamic Focus window is displayed.
   Check the "Enable" checkbox. If already checked, this operation is not necessary.



3. Switch the scan mode to Slow, and adjust the focus for the entire observation window by using the slide button.
   A correction amount is displayed in the upper middle of the slide bar.



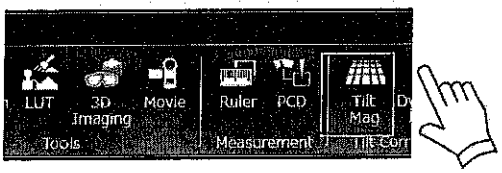
The corrected amount is retained even after closing the dynamic focus window.
To release the correction, set the correction amount to zero by using the slide button.

4.2.8.b Correcting a magnification error

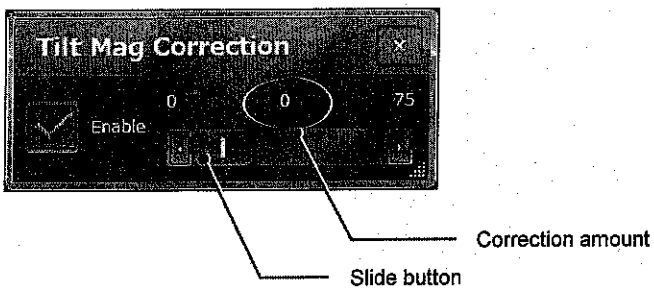
(Tilt Mag. correction)
Magnification variance may occur in the observation window when conducting observation with the specimen stage T-axis being tilted.
Use the tilt mag. correction function for correcting the magnification variance due to T-axis tilt.
Before using the equipment, set the scan rotation angle to zero degree for correcting a magnification error in the tilt direction of the stage T-axis.

1. Adjust the focus at the center of the observation image.
   Before the focus adjustment, set the scan rotation angle to "0°."
   ⇒ See 4.2.9.

2. Tap the Tilt Mag icon from Home.
   The Tilt Mag Correction window is displayed.
   Check the "Enable" checkbox. If already checked, this operation is not necessary.



3. Switch the scan mode to Slow and adjust the correction amount by using the slide button.
   A correction amount is displayed in the upper middle of the slide bar.

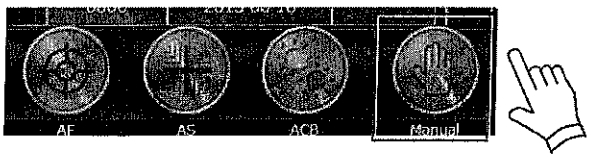


The correction amount is retained even after closing the trapezoidal correction window.
To release the correction, set the correction amount to zero by using the slide button.

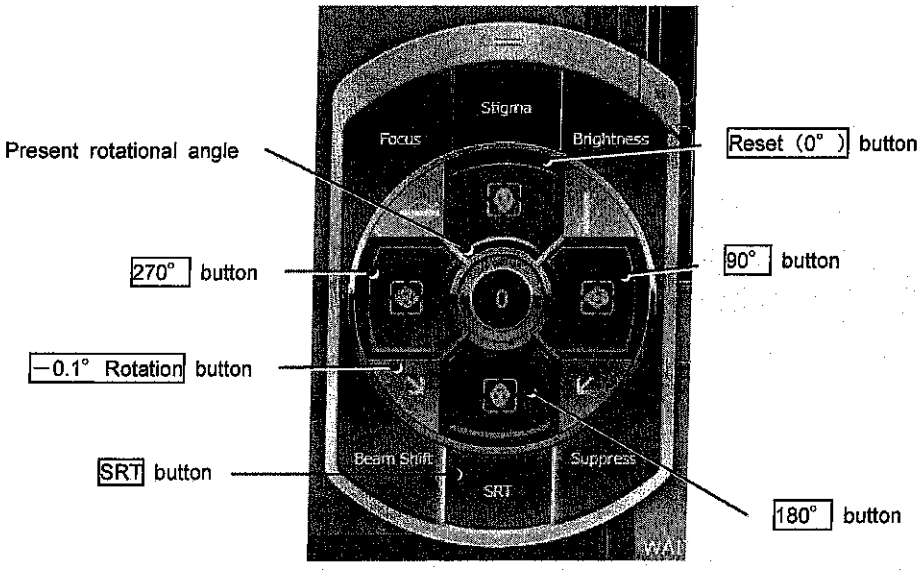
4.2.9 Rotating an image

(Scan rotation)
Use the scan rotation function for rotating the image in the observation window by rotating the scanning direction of the electron beam on the specimen instead of directly rotating the specimen.

1. Tap the Manual icon.
   The manual adjustment tool is displayed.



2. Tap the SRT button and rotate the image by referring to the following illustration:
   Tapping the +0.1° Rotation button or −0.1° Rotation button rotates the image by +0.1° or −0.1°. In addition, continuously pressing the button continuously rotates the image.
   Tapping the 90° button (180° or 270° button) rotates the image by 90° (180° or 270°) from "0°" as the reference.
   Tapping the Reset (0°) button makes reset the rotation angle to 0° .



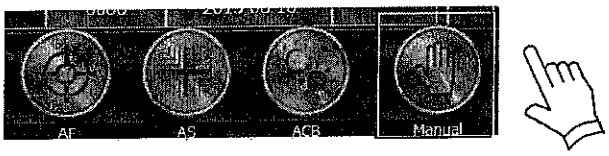
- The image is continuously rotated by rotating the mouse wheel or continuously pressing the left button with the mouse cursor located on the +0.1° Rotation button or −0.1° Rotation button.
- Using a mouse wheel enables rotation in both directions on one button.

Example: Rotate the mouse wheel by locating the mouse cursor on the +0.1° Rotation button.
⇒ Continuous rotation at the rate of +0.1° or −0.1° is possible.

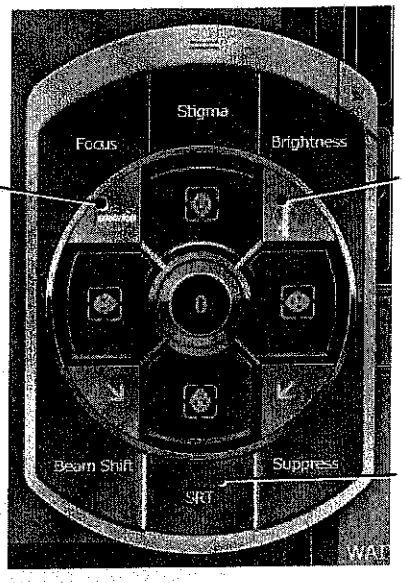
(Scan horizontal correction function and scan vertical correction function)
The target object can be corrected horizontally or vertically by using a straight line drawn on the observation image.

Example: Case of scan horizontal correction

1. Tap the Manual icon.
   The manual adjustment tool is displayed.



2. Tap the SRT button and Scan Horizontal Correction button.

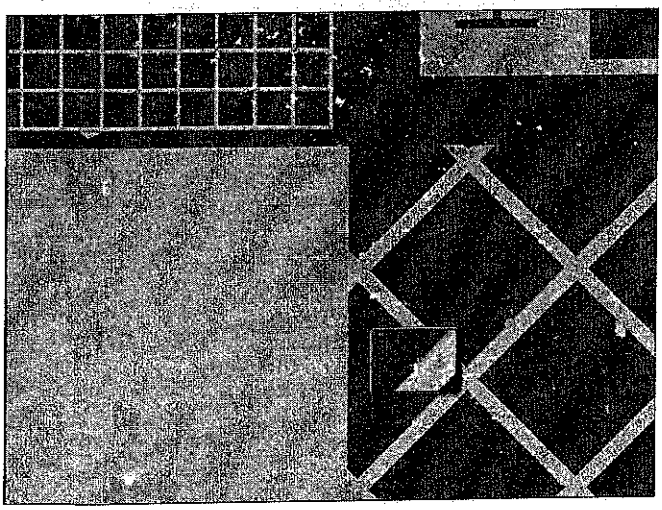


Scan Horizontal correction button

Scan Vertical correction button

SRT button

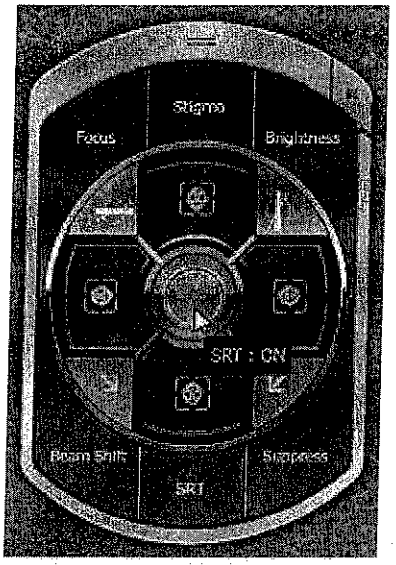
3. Specify beginning and end points of a line along the target object desired to horizontalize in the main window.



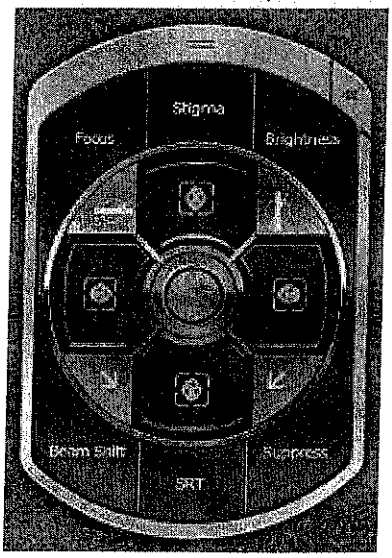
4. The target object is horizontally corrected.
   Scan rotation horizontally corrects the target object.
   ※ When selecting scan vertical correction, the target object is vertically corrected.

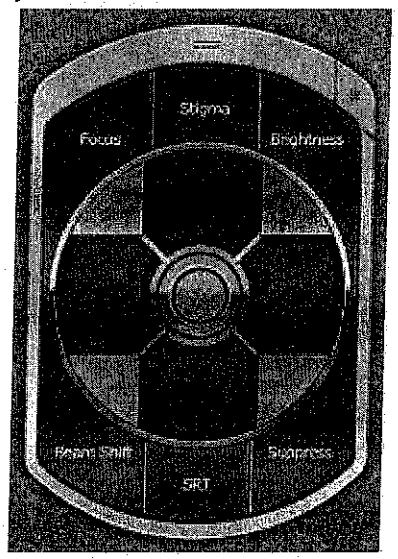
Check ON/OFF of SRT function

The SRT button is selected, and put the mouse cursor on the center of manual tool, SRT ON (Enable)/ OFF (Disable) is displayed as below.



To switch ON/OFF, tap the center of the manual adjustment tool.





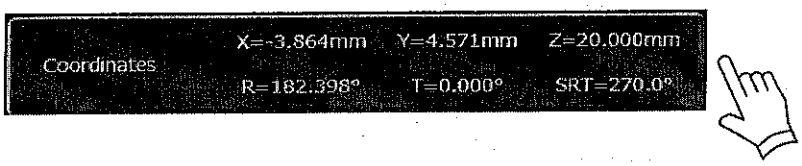
4.2.10 Avoiding vision shift due to stage rotation

4.2.10.a Eucentric R function

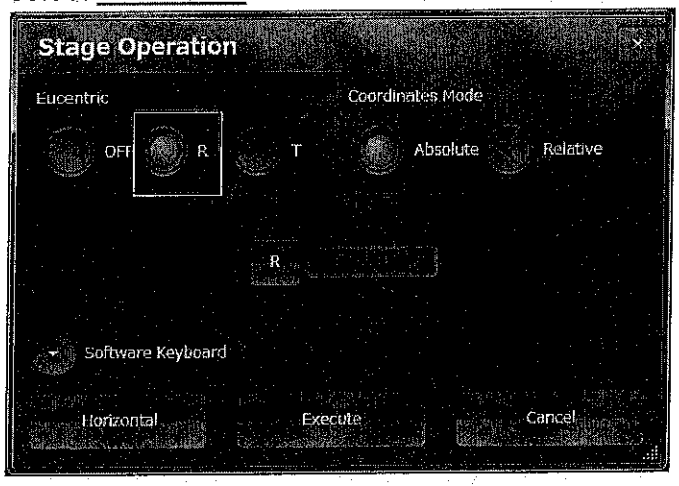
A target object can be visualized at the center of the observation window without losing the sight of the object by rotating the stage as if the object were actually rotating.

※ Use this function at a magnification of ×1000 or less, as using it at a high magnification might lose the sight of the target object.

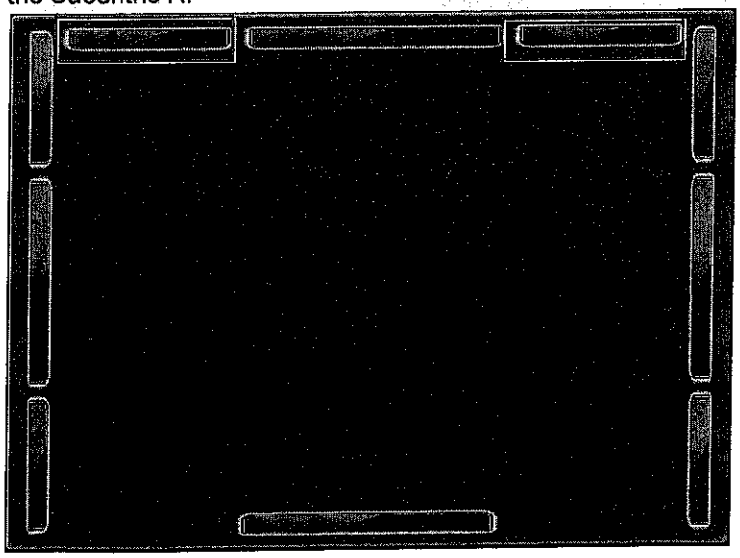
1. Tap the coordinates display field.
   The Stage Operation window is displayed by tapping outside the SRT display field.



2. Select Eucentric R.



3. Enter a rotation angle into R and tap the Execute button.
   Ensure that the target object is rotating at the center of the main screen.
   Continuously press the eucentric R displacement button of the main screen for continuously displacing the eucentric R.



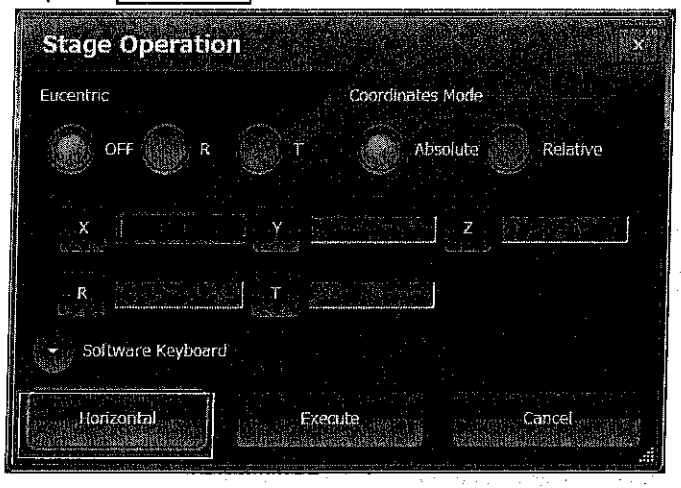
4.2.10.b Stage horizontal correction function

The target object can be corrected horizontally by using a straight line drawn on the observation image.

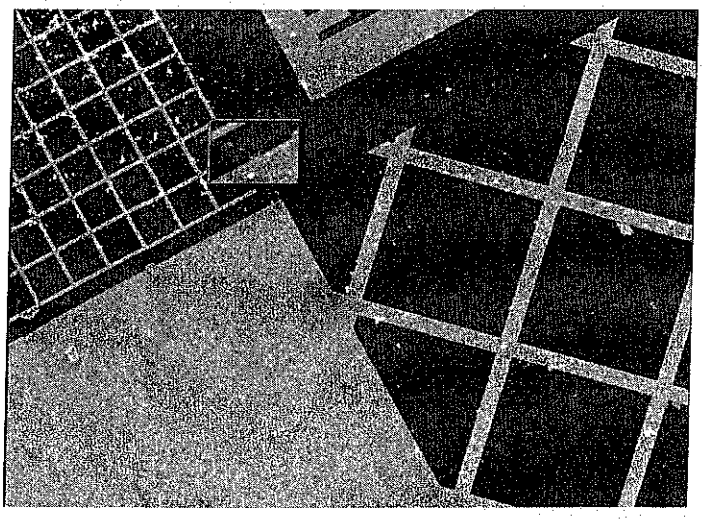
※ Use this function at a magnification of ×1000 or less, as using it at a high magnification might lose the sight of the target object.

1. Tap the coordinates display field.
   The Stage Operation window is displayed by tapping outside the SRT display field.

2. Tap the Horizontal button.



3. Specify beginning and end points of a line along the target object desired to horizontalize in the observation window.



4. The target object is horizontally corrected.
   The target object is horizontally corrected by rotating the stage R-axis.

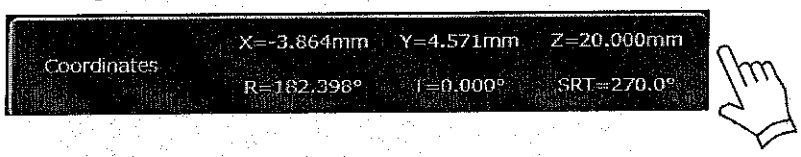
4.2.11 Preventing vision shift due to the variance of specimen heights

(Eucentric T function)
This function can prevent vision shift in the Y and Z-axis directions due to the T-axis tilt caused by the height variance of specimens. The function is effective for entering a protrusion amount of the specimen (or height of the specimen) when mounting it.

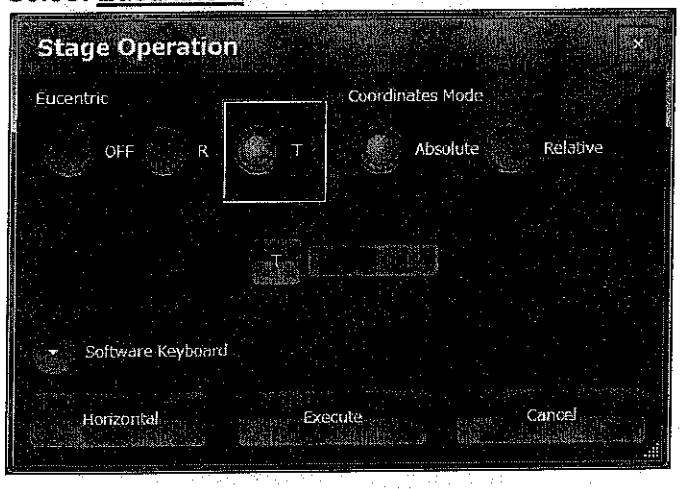
※ **Use this function at a magnification of ×500 or less, as using it at a high magnification might lose the sight of the target object.**

※ **In case a variance exists between the actual specimen height and the specimen height entered when mounting it, the sight of the target object might be lost.**

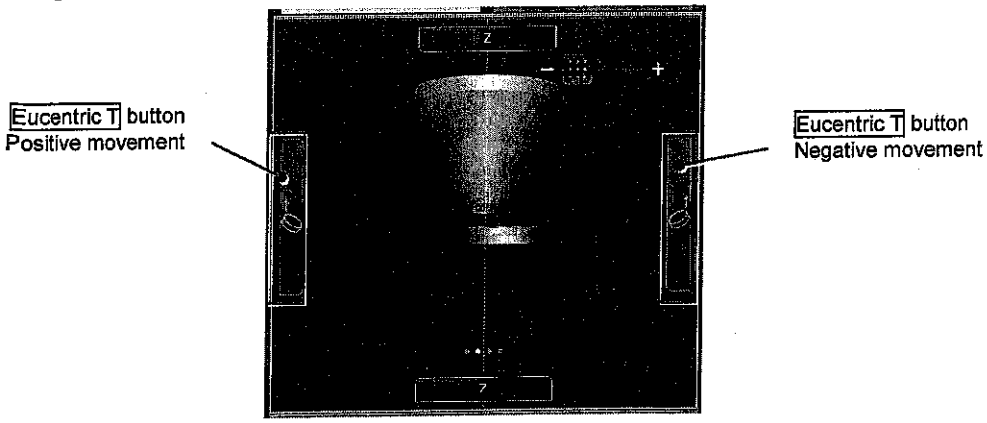
1. Tap the coordinates display field.
   The stage operation window is displayed by tapping outside the SRT display field.



2. Select Eucentric T.



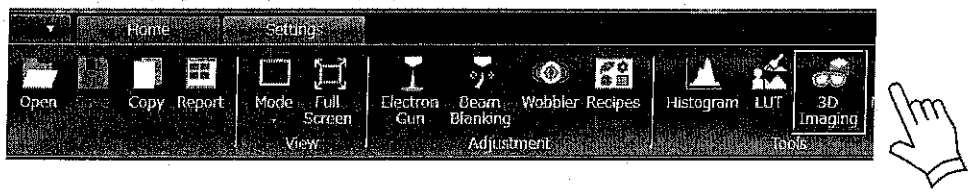
3. Enter a rotation angle into T and tap the Execute button.
   Ensure that the target object is visible within the observation range.
   Continuously press the eucentric T displacement button of the observation image for continuously displacing the eucentric T.



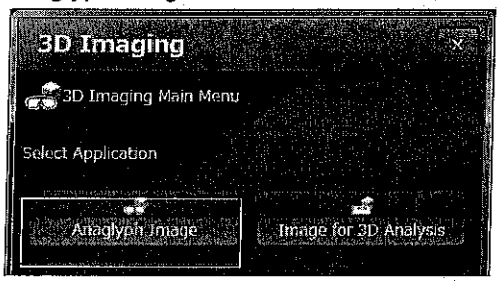
4.2.12 Obtaining an anaglyph image

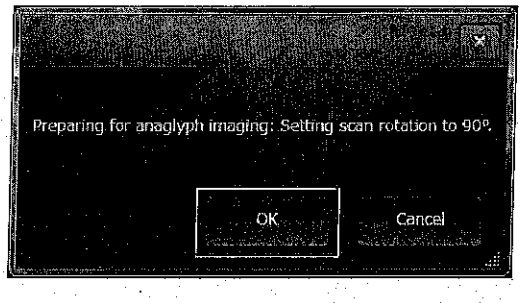
Anaglyph image is defined as an image visualized in three dimensions through red-blue glasses.

1. Tap the 3D Imaging icon from Home.
   The 3D Imaging window is displayed.

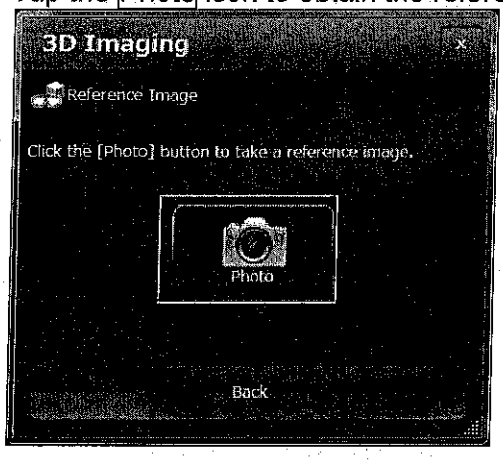


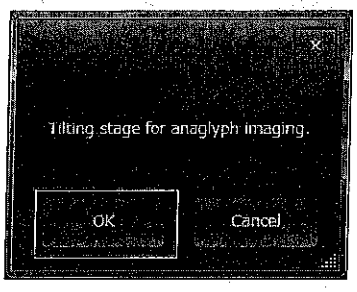
2. Tap the Anaglyph Image icon and then the OK button of the confirmation message.
   The scan rotation is automatically set to a status suitable for obtaining a reference image of the anaglyph image.



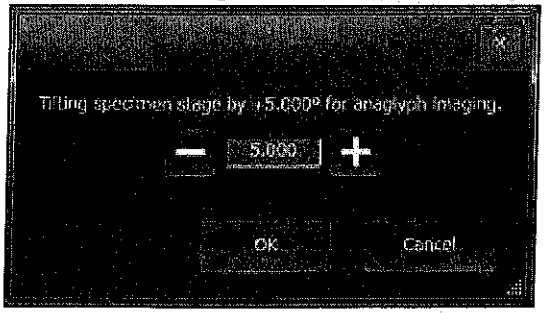


3. Tap the Photo icon to obtain the reference image.

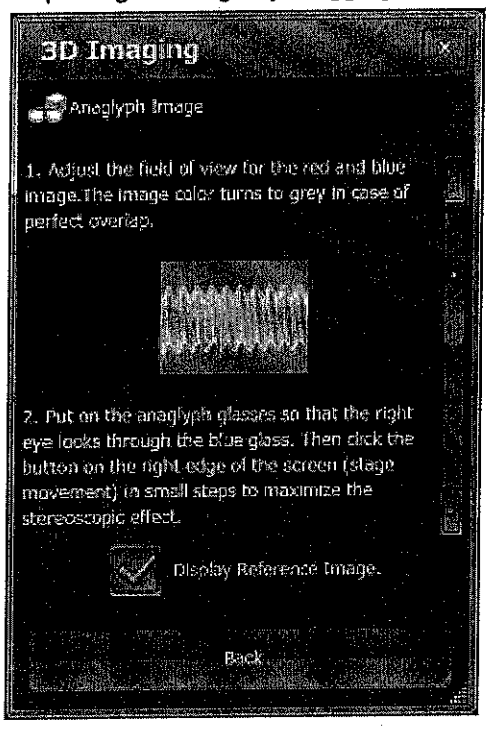


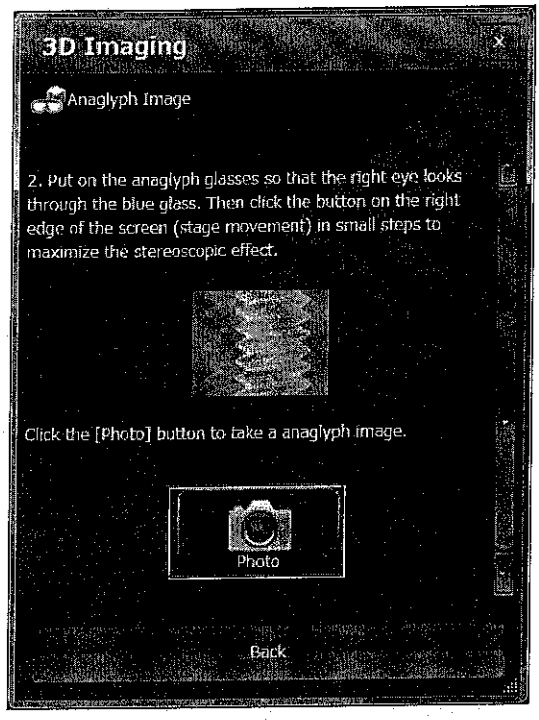


4. Specify the tilt angle of the specimen stage and tap OK button.
   The specimen stage moves at specified angle, it is set in a state suitable for creating anaglyph image.



5. Wear red-blue glasses and obtain an anaglyph image by following the guide messages.
Superimpose the reference and tilted images, and, upon finding a point visualizing the object in three dimensions, tap the Photo icon.
Displacing the stage by dragging is convenient when superimposing the images. ⇒ See 3.9.2.





Display Reference Image. : When you check it, the reference image is displayed onto the tilted image.
Reference Image : RED
Tilted Image : BULE

6. After obtaining an anaglyph image, tap the Close button of the confirmation message.
Anaglyph imaging is terminated.

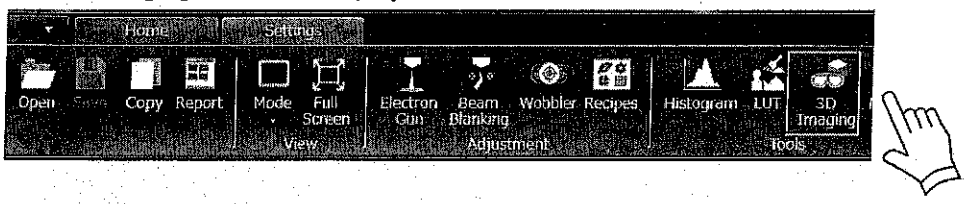
Observation conditions are reset to those prior to anaglyph imaging.
The file of the obtained anaglyph images is named and saved as
"Reference image file name + Anaglyph."

Wear red-blue glasses for viewing the anaglyph images.

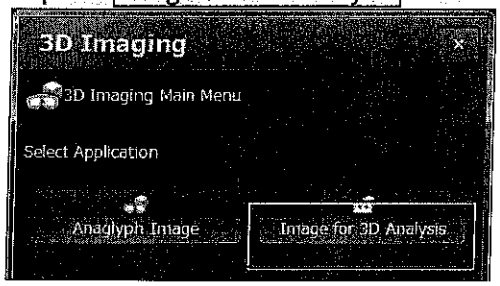
4.2.13 Obtaining a three-dimensional measurement image

This function enables easy saving of two images having different angles and a same vision (stereo pair). Using these two images and the optional three-dimensional software, the function shows a bird's-eye view enabling three-dimensional observation of images and specimen structure, thereby allowing dimensional measurement of spatial structure from the bird's eye view.
For details of the three-dimensional software, see the operating manual of the three-dimensional image software.

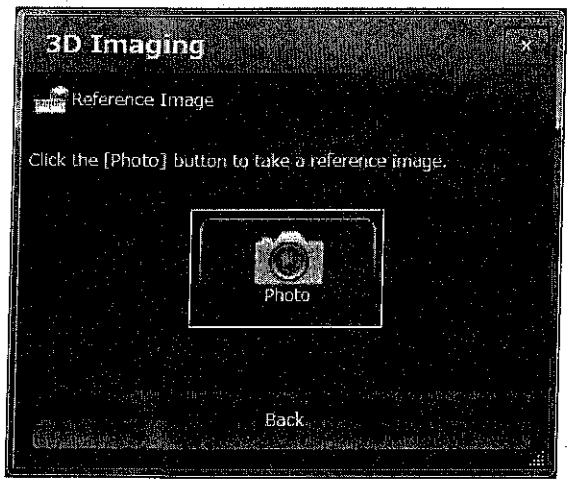
1. Tap the 3D Imaging icon from Home.
   The 3D Imaging window is displayed.

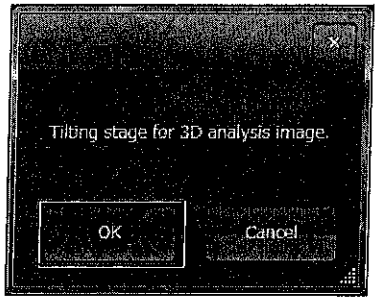


2. Tap the Image for 3D Analysis icon.

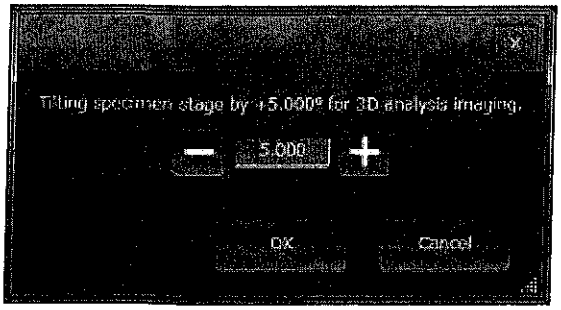


3. Tap the Photo icon to obtain the reference image.

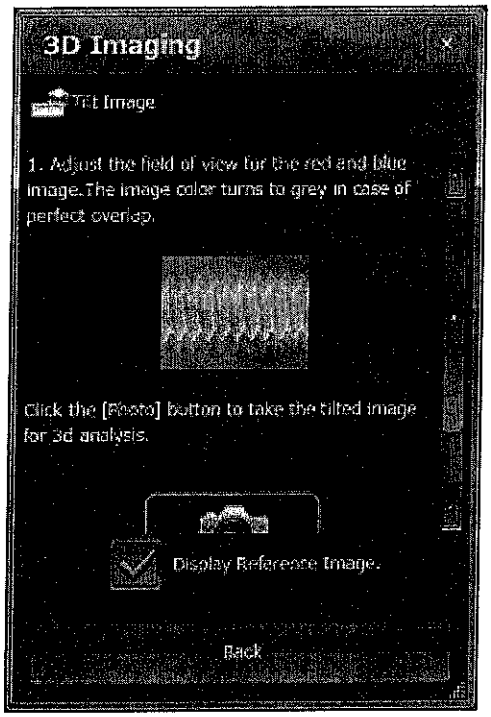




4. Specify the tilt angle of the specimen stage and tap OK button.
   The specimen stage moves at specified angle, it is set in a state suitable for creating 3D analysis image.



5. Obtain a tilted image by following the guide messages.
Upon superimposing the reference and tilted images, tap the Photo icon.
Display Reference Image. : When you check it, the reference image is displayed onto the tilted image.
Reference Image : RED
Tilted Image : BULE



6. Upon obtaining a tilted image, tap the Close button of the confirmation message.
Three-dimensional imaging is terminated.

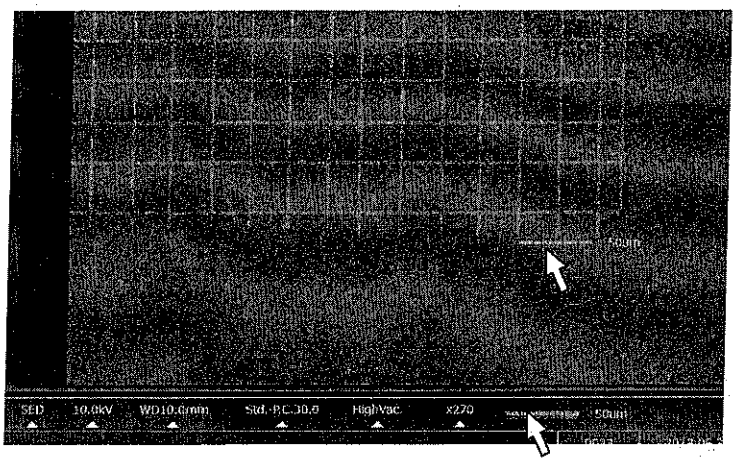
Observation conditions are automatically reset to those before obtaining tilted images.
The file of the obtained three-dimensional images (a pair of two images) is named and saved as "Reference image file" and "Reference image file name + Tilted."

Case of the optional three-dimensional image software being installed:
As a message prompting startup of the three-dimensional image software is displayed, start the software as desired. For details, see the operating manual of the optional three-dimensional image software.

4.3 ITEMS ASSOCIATED WITH MEASUREMENT AND TEXT

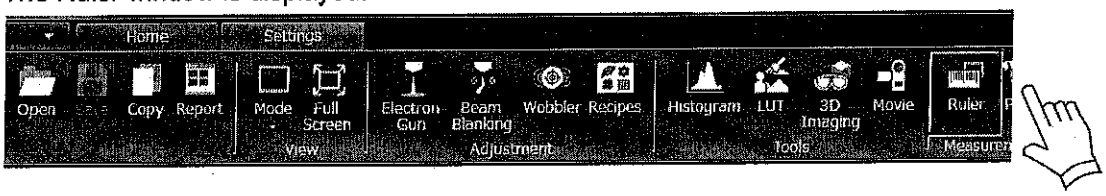
4.3.1 Conducting measurement by using a micron bar

Dragging the micron bar into the main window enables simple measurement of lengths.

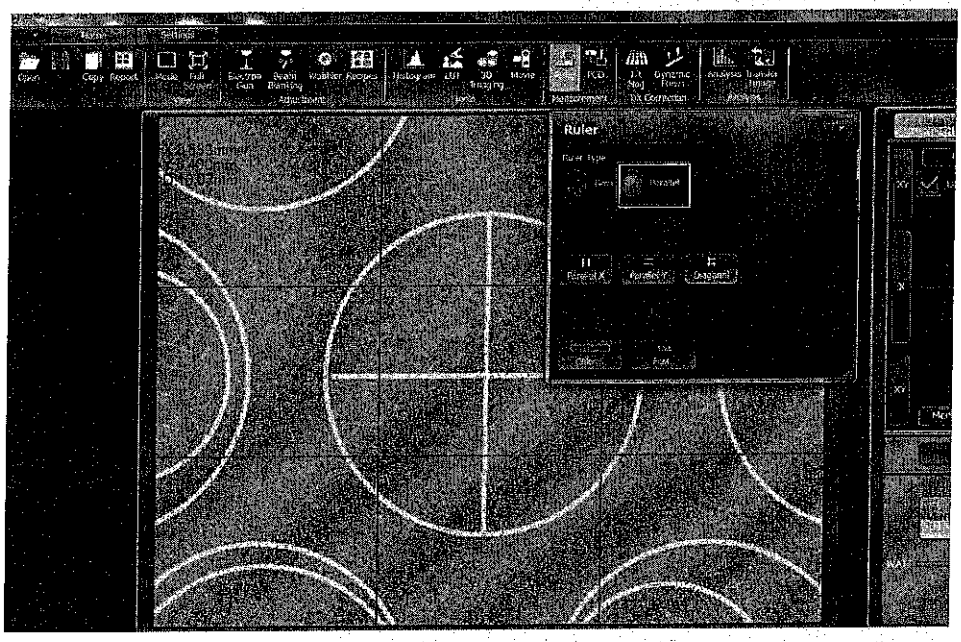


4.3.2 Measuring the distance between lines (X, Y and diagonal)

1. Tap the Ruler icon from Home.
   The Ruler window is displayed.



2. Select Parallel for the Ruler type and select the ruler direction.
   Lateral direction: Select Parallel X. (Two cursors are displayed in the vertical direction.)
   Longitudinal direction: Select Parallel Y. (Two cursors are displayed in the horizontal direction.)
   Diagonal direction: Select Diagonal. (Two cursors are displayed in each of the horizontal and vertical directions.)



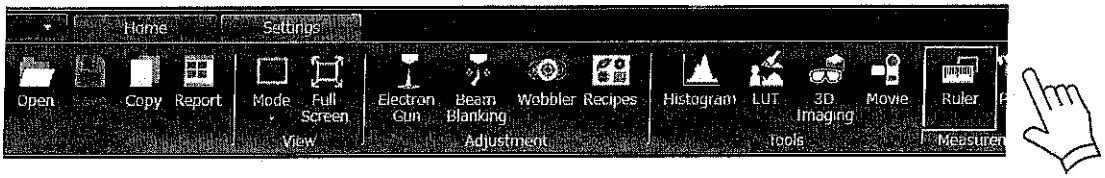
Example: Case of selecting the diagonal direction (Diagonal)

3. Drag the displayed cursor and set a measurement point.
   Case of the lateral/longitudinal direction: Drag the cursor corresponding to each direction.
   Case of the diagonal direction: Drag the cross point of the cursors.

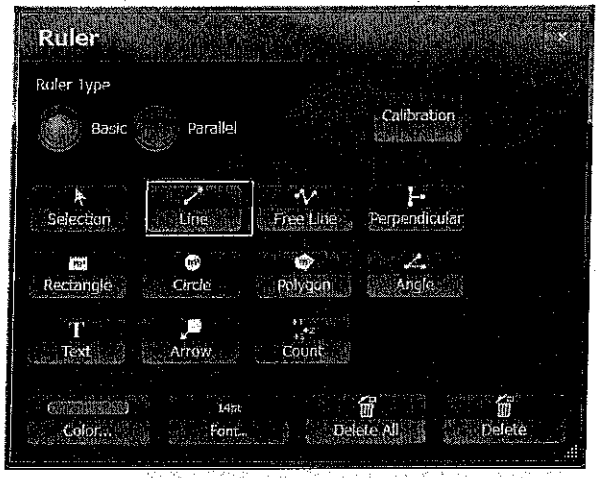
   Measured values are displayed in the upper left of the screen in real time.

4.3.3 Measuring the distance between two points

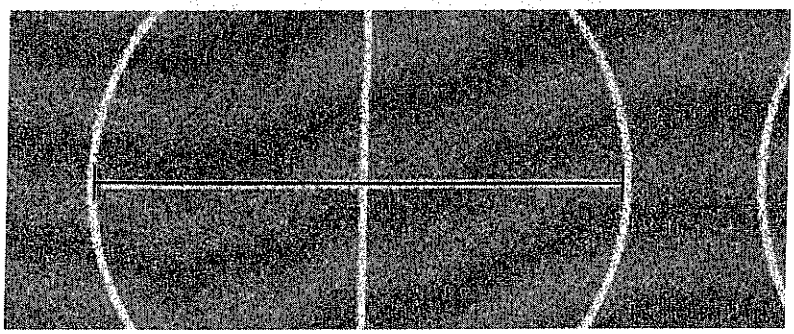
1. Tap the Ruler icon from Home.
   The Ruler window is displayed.



2. Select Basic for the Ruler type and tap the Line icon.

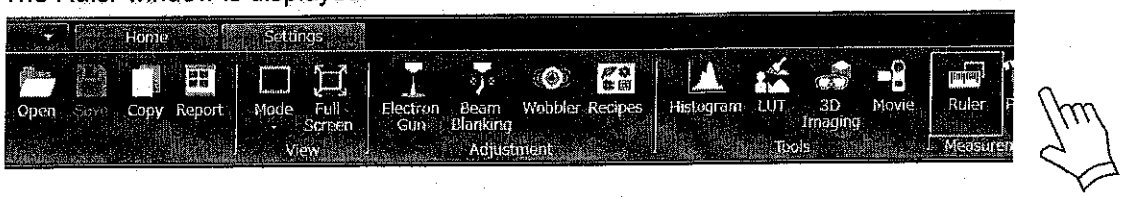


3. Tap the beginning and end points of the target object.
   The line segment connecting the beginning and end points is determined, and the distance is displayed.

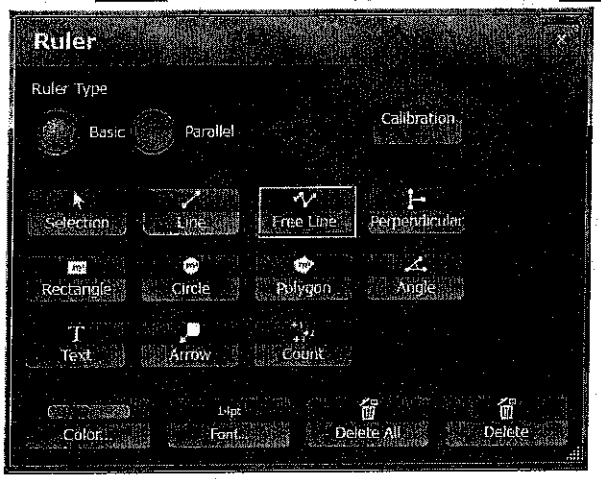


4.3.4 Measuring the total distance of straight lines connecting multiple points

1. Tap the Ruler icon from Home.
   The Ruler window is displayed.

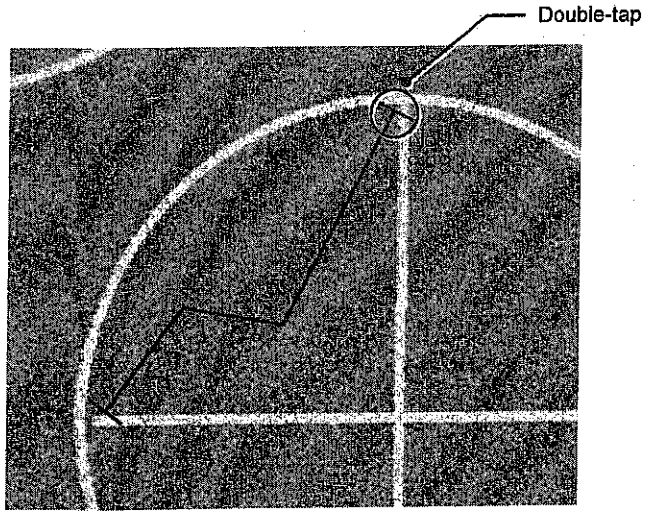


2. Select Basic for the Ruler type and tap the Free Line icon.



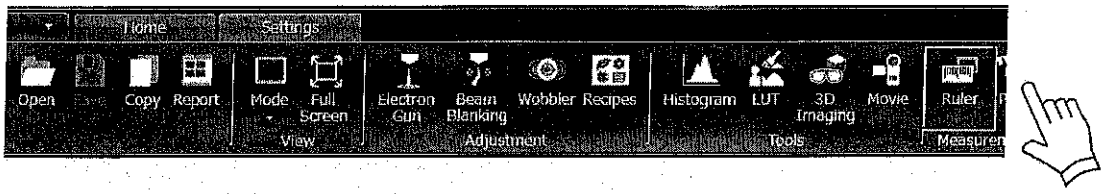
3. Specify the beginning point of the target object and then a junction point in an arbitrary position.
   Successively conduct this operation.

4. Double-tap the end point of the target object.
   The line segment connecting the beginning, junction and end points is determined, and the total distance is displayed.

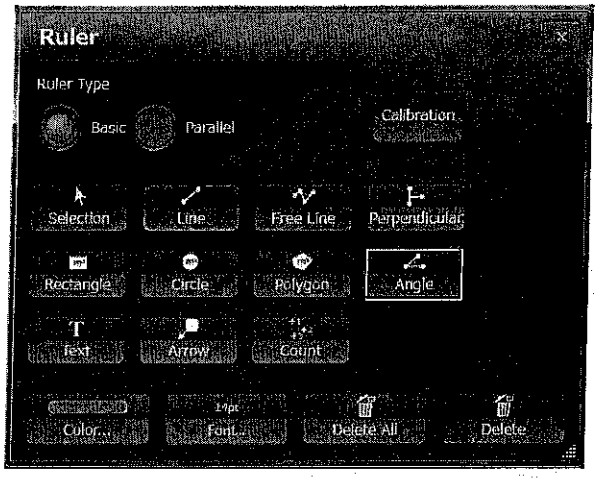


4.3.5 Measuring an angle

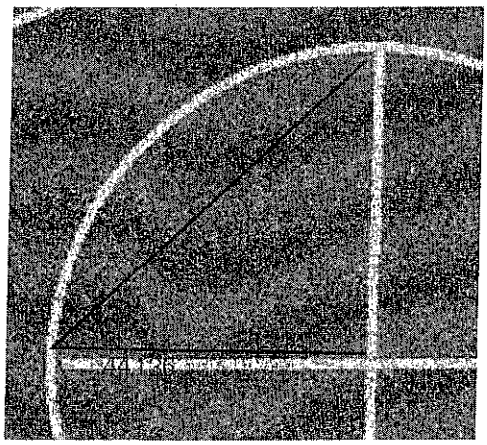
1. Tap the Ruler icon from Home.
   The Ruler window is displayed.



2. Select Basic for the Ruler type and tap the Angle icon.

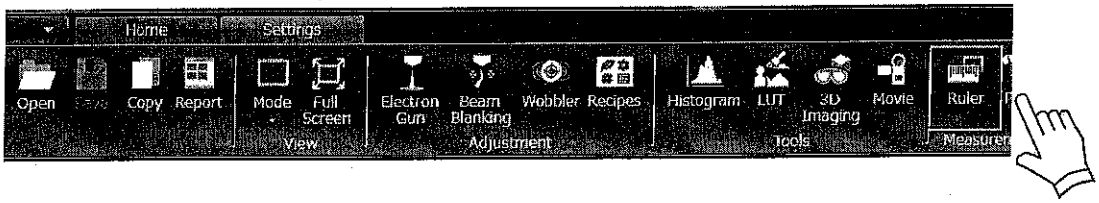


3. Sequentially tap the beginning, apical and end points of the target object.
   The angle to be measured is determined and the measured value is displayed.

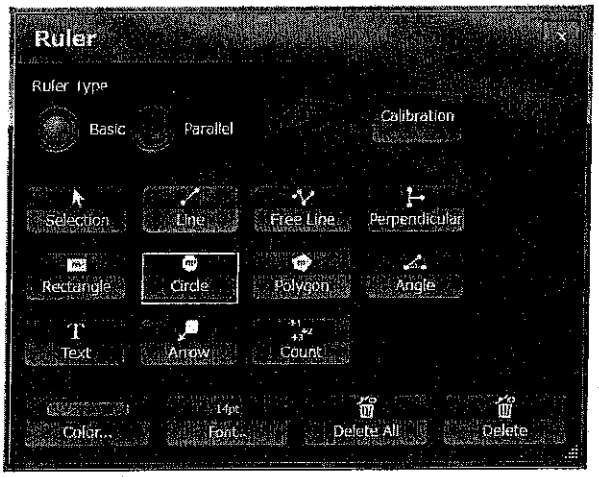


4.3.6 Measuring the area of a circle (or ellipse)

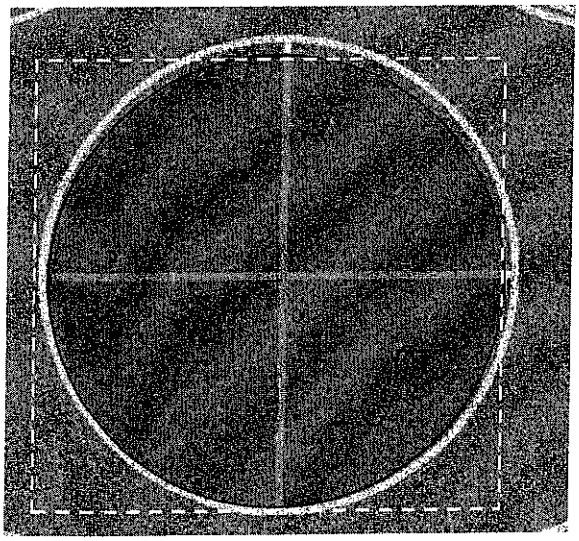
1. Tap the Ruler icon from Home.
   The Ruler window is displayed.



2. Select Basic for the Ruler type and tap the Circle icon.

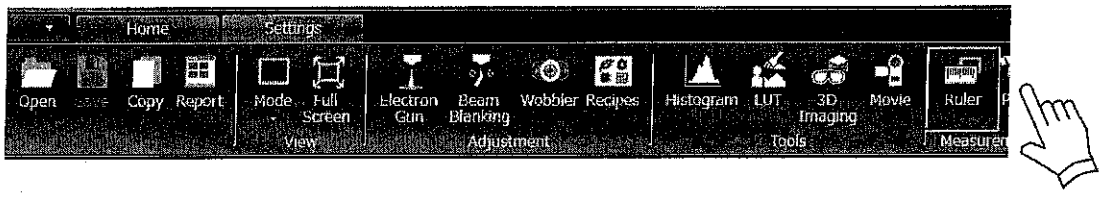


3. Draw a circle (or ellipse).
   An inscribed circle (or ellipse) is drawn in a rectangle by sequentially tapping the beginning and end points in a manner similar to the case of drawing a diagonal line for a rectangle.
   Upon completing the drawing, the area of the circle (or ellipse) is displayed.

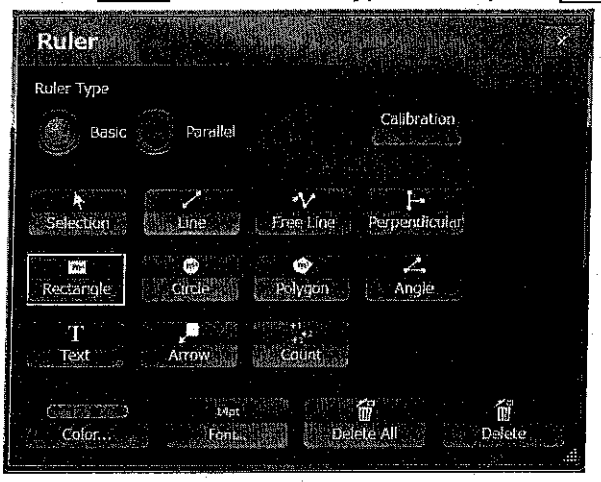


4.3.7 Measuring the area of a rectangle

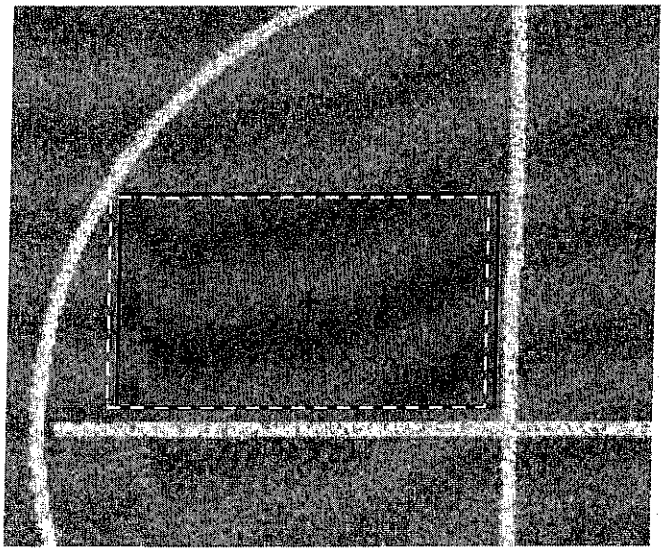
1. Tap the Ruler icon from Home.
   The Ruler window is displayed.



2. Select Basic for the Ruler type and tap the Rectangle icon.

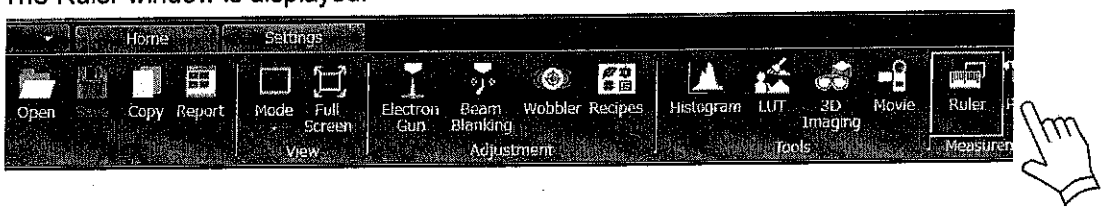


3. Specify an opposite vertex to determine the domain of a rectangle.
   A rectangle is drawn and its area is displayed.

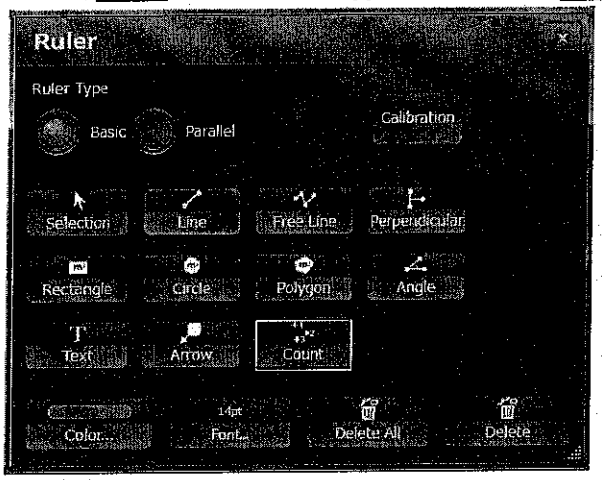


4.3.8 Counting the number of target objects

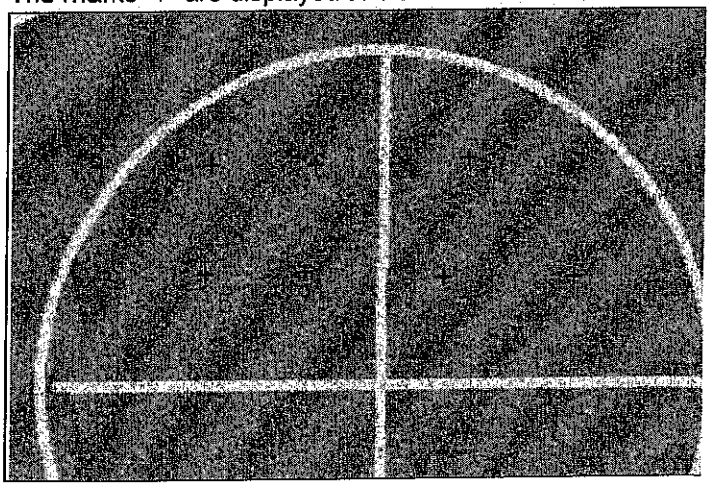
1. Tap the Ruler icon from Home.
   The Ruler window is displayed.



2. Select Basic for the Ruler type and tap the Count icon.

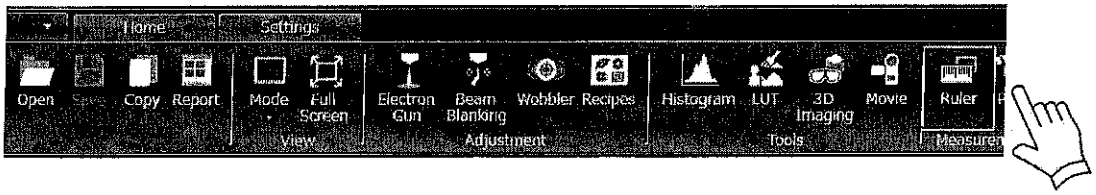


3. Sequentially tap the target objects subject to counting.
   The marks "+" are displayed and the total number thereof is displayed.

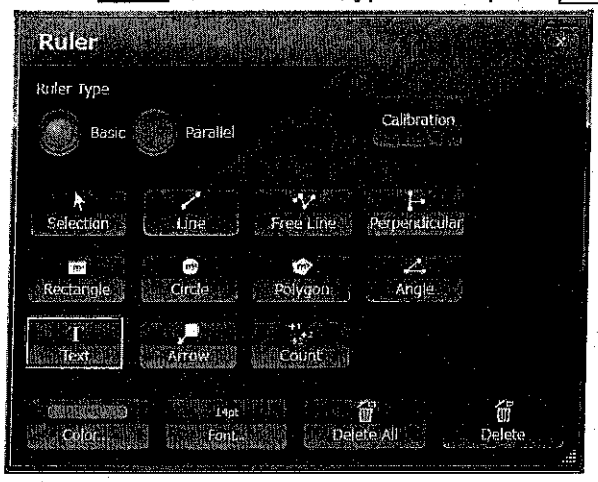


4.3.9 Entering a text in the observation window

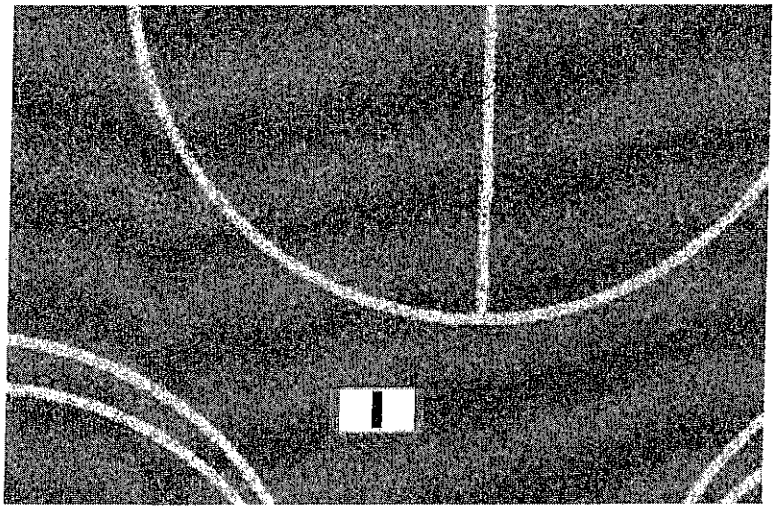
1. Tap the Ruler icon from Home.
   The Ruler window is displayed.



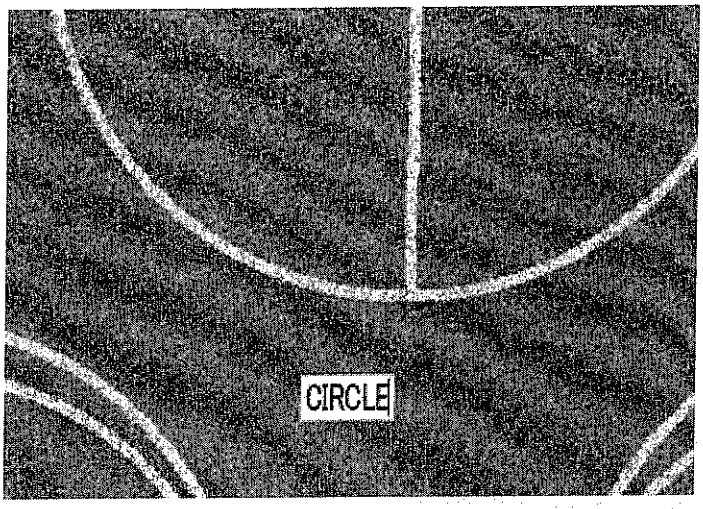
2. Select Basic for the Ruler type and tap the Text icon.



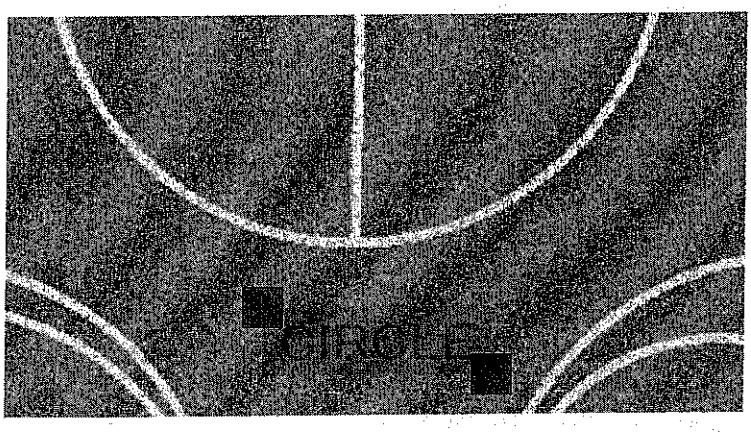
3. In the observation window, tap a position into which a text is desired to insert.



4. Entering a text and pressing the Enter key confirms the text.
The color, font and size of the text conform to Windows OS.

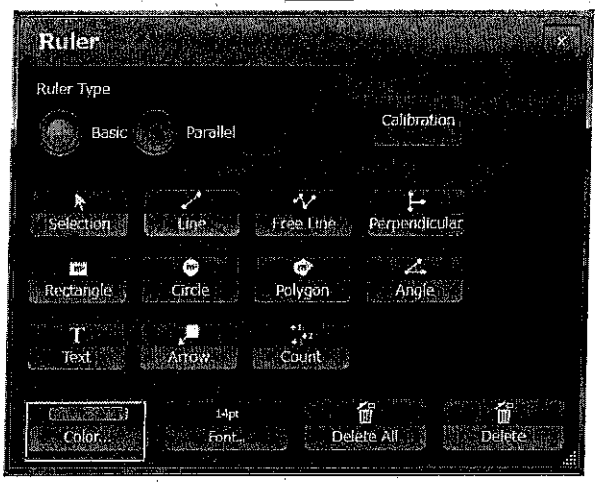


Dragging the confirmed text enables displacing the displaying location.
Dragging ■ in the text box enables the scaling of the box.

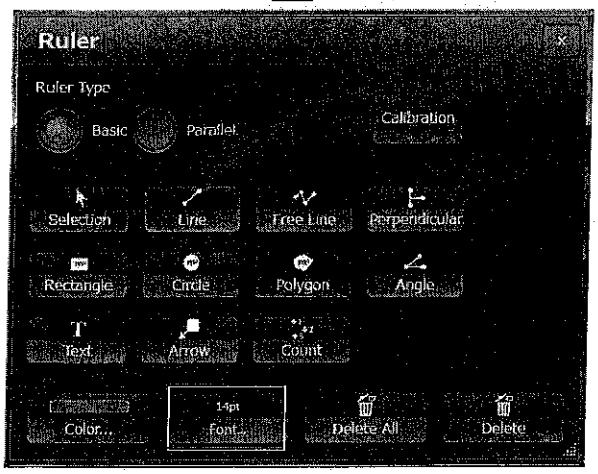


4.3.10 Changing the color and font of a text

1. Changing the color
   a. Bring up the Color selection window by tapping the Color icon.
   b. Select a color, and tap the Apply button.

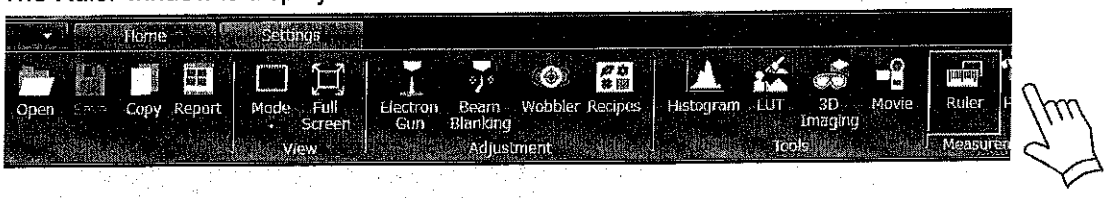


2. Changing the font
   a. Bring up the Font window by tapping the Font icon.
   b. Select a font, and tap the OK button.

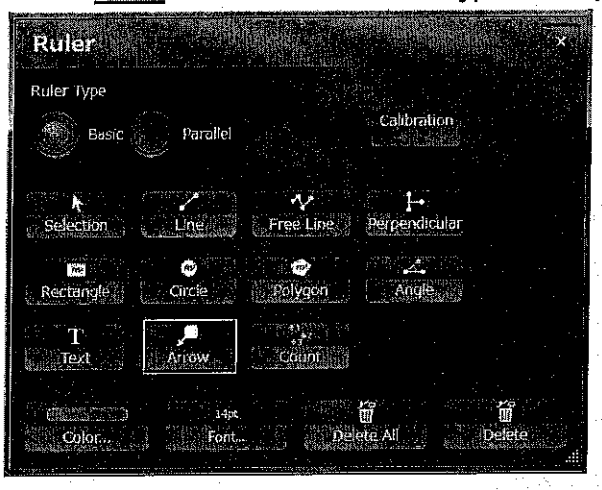


4.3.11 Inserting an arrow in the observation window

1. Tap the Ruler icon from Home.
   The Ruler window is displayed.



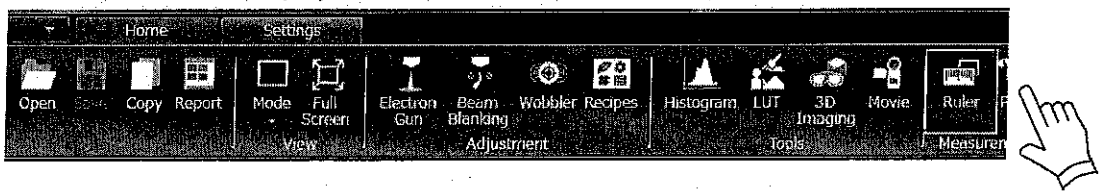
2. Select Basic for the measurement type and tap the Arrow icon.



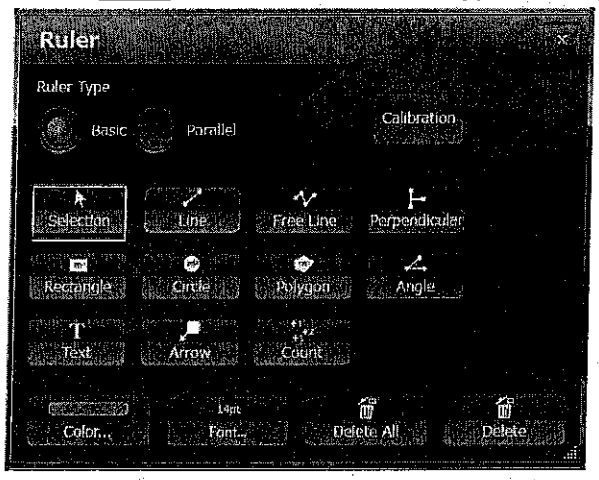
3. Sequentially tap the beginning and end points in the observation window to specify an arrow.

4.3.12 Changing the color and/or font of the location subject to measurement

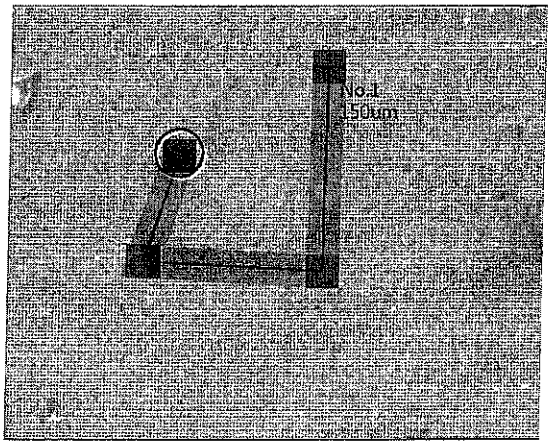
1. Tap the Ruler icon from Home.
   The Ruler window is displayed.



2. Select Basic for the measurement type and tap the Select icon.



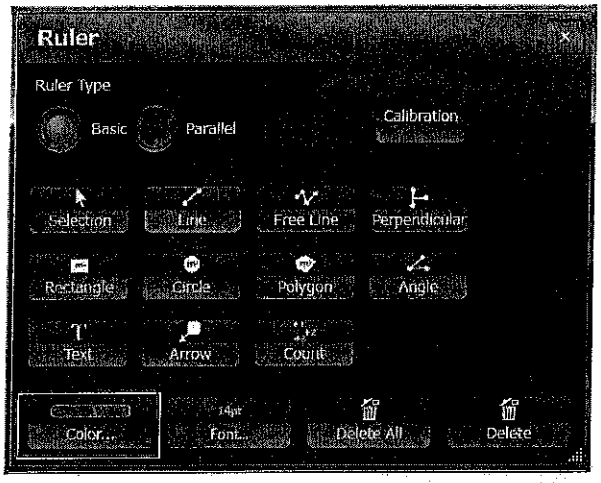
3. Tap the measurement location desired to change the color and/or font.



4. Change the color and/or font.

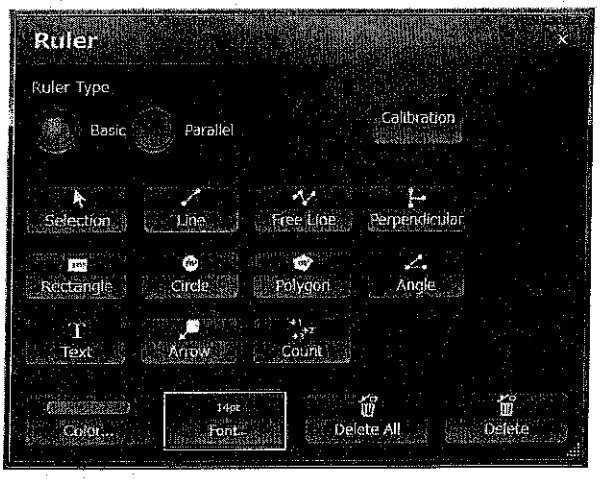
Changing the color

Bring up the color selection window by using the Color icon, select a color, and tap the Apply button.

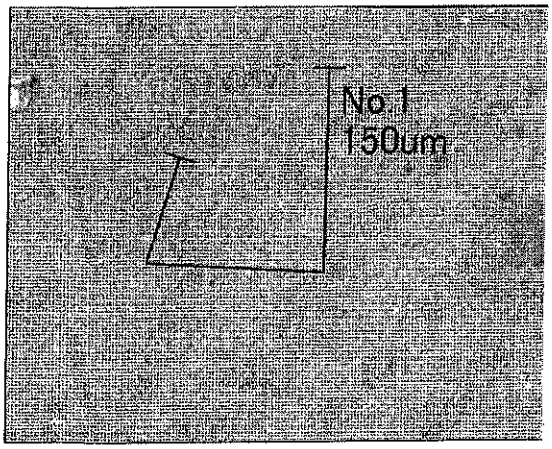


Changing the font

Bring up the font window by using the Font icon, select a font, and tap the OK button.

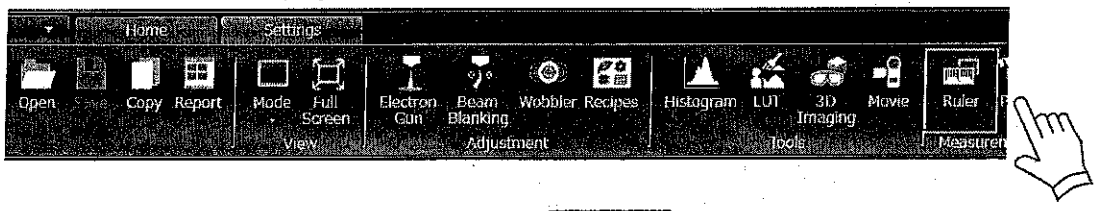


5. The color and/or font of the measurement location is changed and displayed.

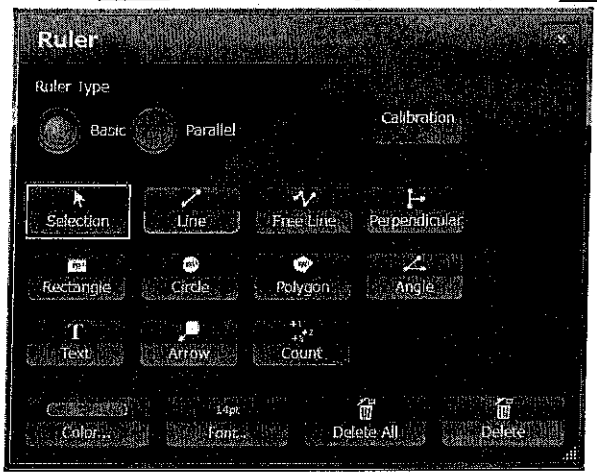


4.3.13 Deleting a measurement location and/or text box

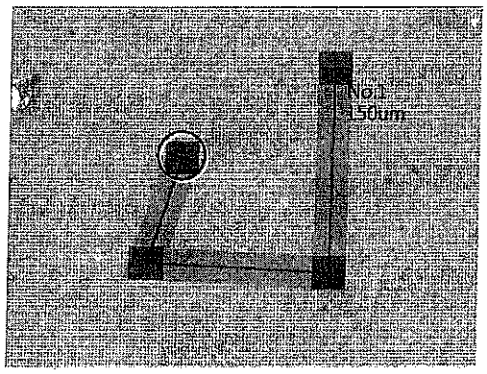
1. Tap the Ruler icon from Home.
   The Ruler window is displayed.



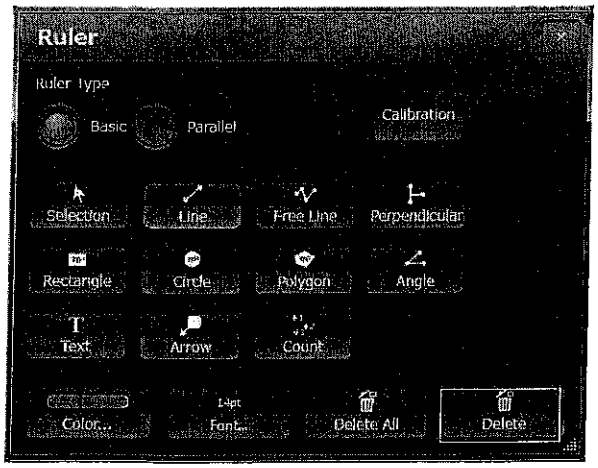
2. Select Basic for the Ruler type and tap the Selection icon.



3. Select a measurement location and/or text box desired to delete.



4. Tap the Delete icon.
   The location for length measurement and/or the text box selected is deleted.
   ※ If all are desired to delete, tap the Delete All icon regardless of selection.



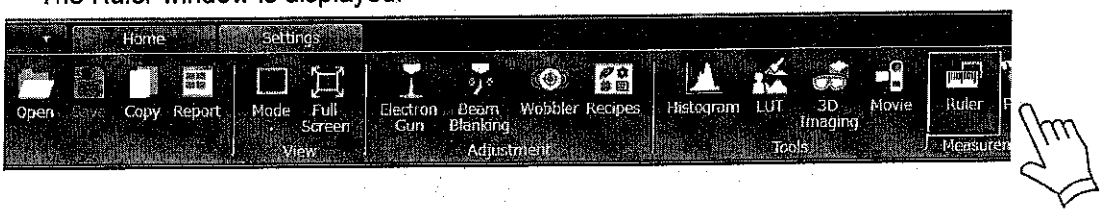
4.3.14 Calibration of Ruler

Measurement accuracy of the factory adjusted for each device, but if you want to measure higher accuracy depending on application, please calibrate by the following procedures

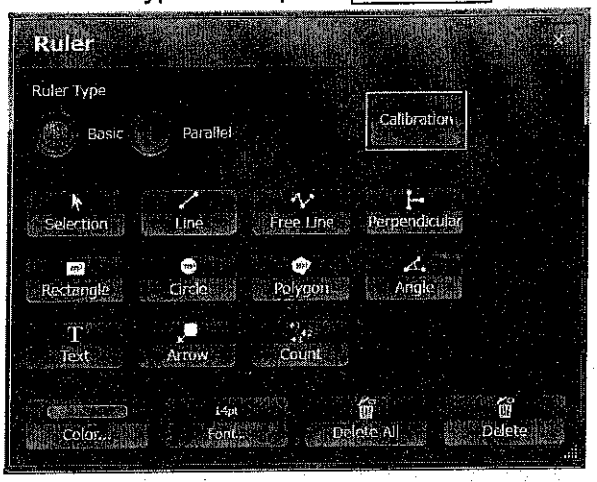
※Please prepare for the specimen which becomes the standard of the length by a customer yourself.

※If you calibrated with accelerating voltage and WD you want to use, you can measure more strictly.

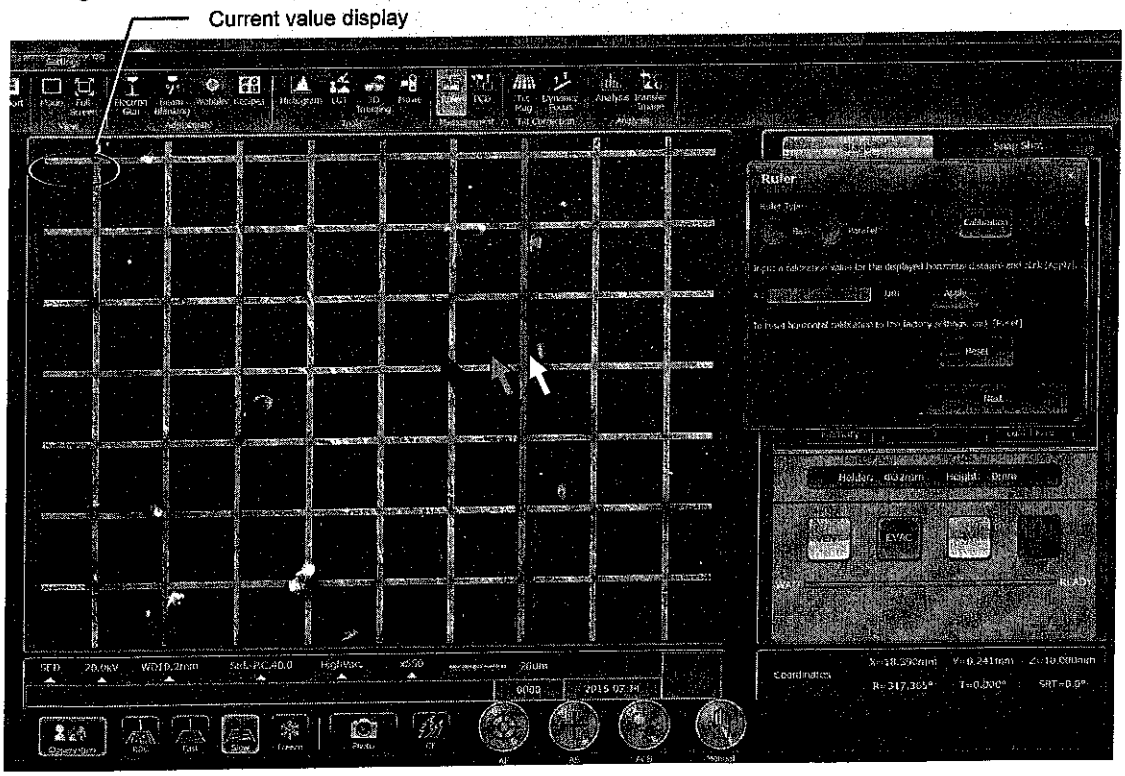
1. Tap the Ruler icon from Home.
   The Ruler window is displayed.



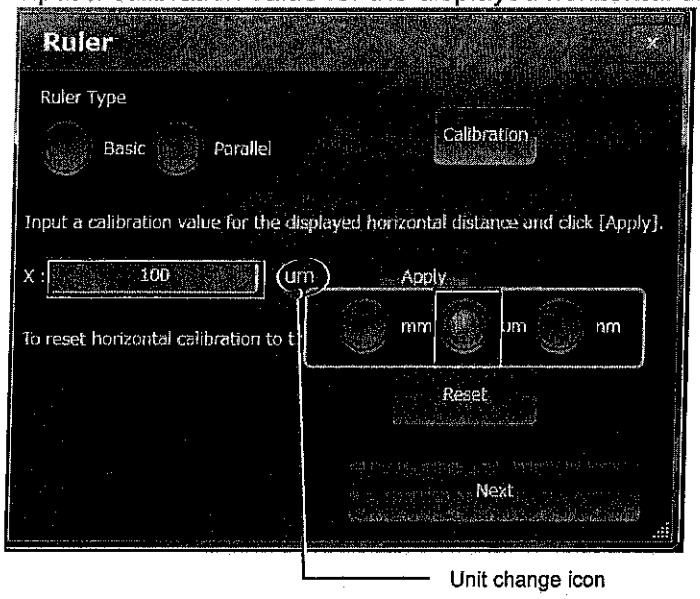
2. Select Basic for the Ruler type and tap the Calibration button.



3. Align the vertical cursor to the calibration standard.



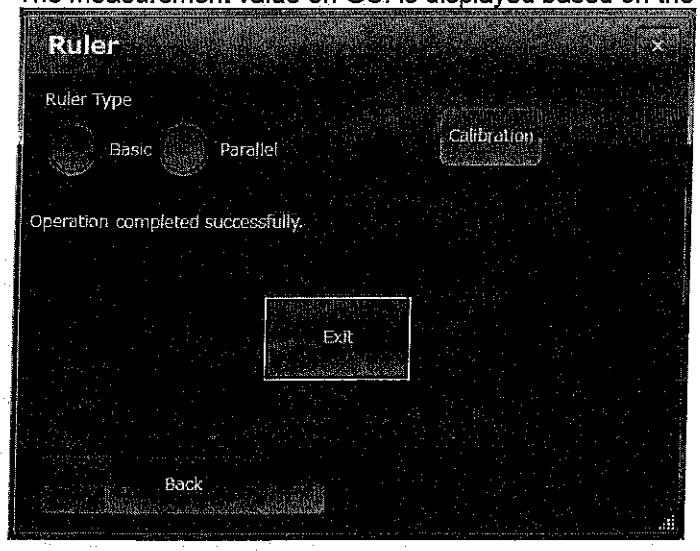
4. Input a calibration value for the displayed horizontal distance and tap Apply button.



※ When you wish to befoul the calibration value , tap the Reset icon.
(at shipment from the factory)
※ Input range of the calibration value is ±3% of the default value.

5. The vertical direction of the calibration.
Perform the same way as the Step 2-4.

6. Tap the Exit button to exit the calibration.
The measurement value on GUI is displayed based on the calibrated value.



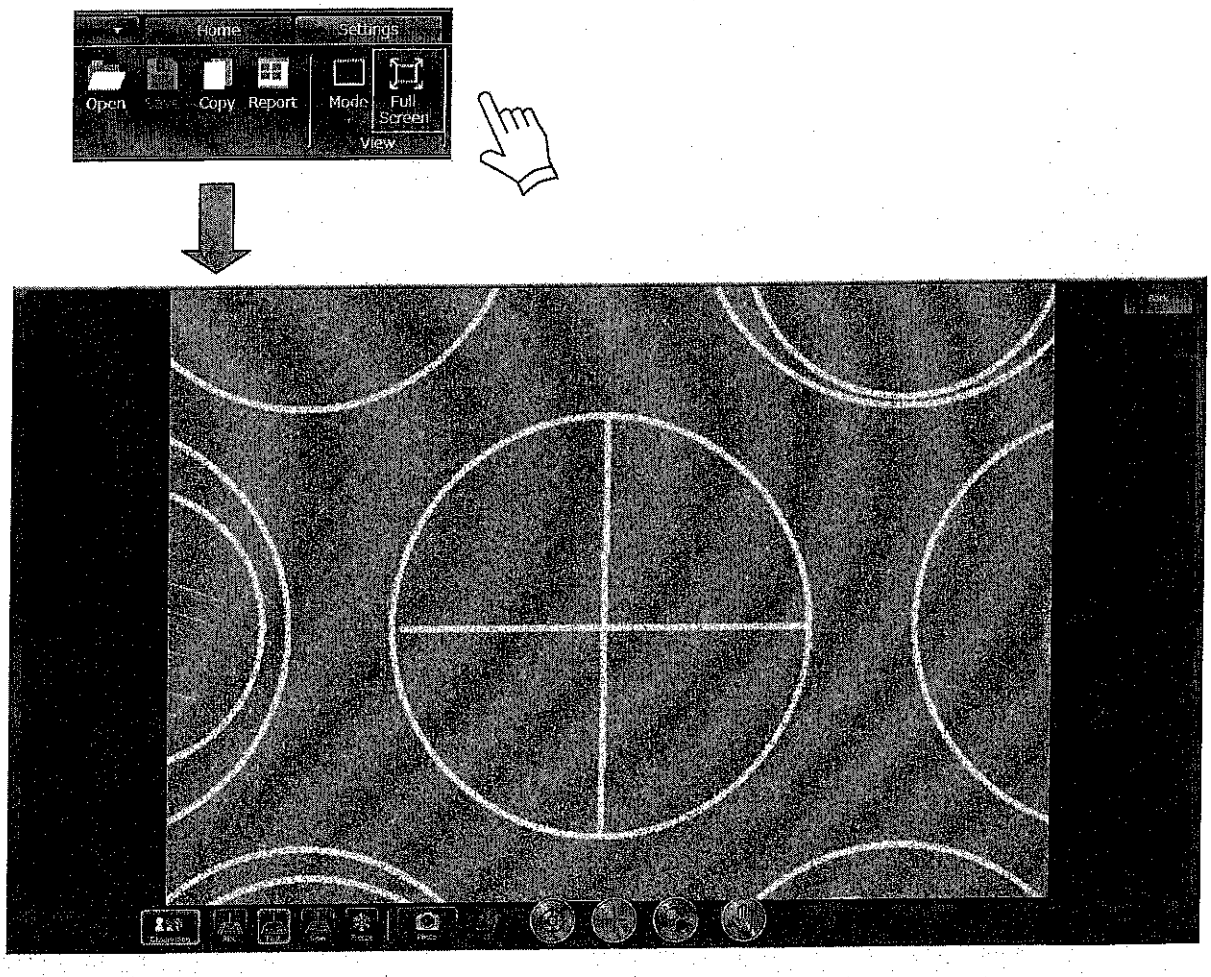
4.4 COMPARISON DISPLAY

4.4.1 Displaying an image in full window

Tap the Full Screen icon from Home.

The observation image is enlarged and displayed in full window of the display.

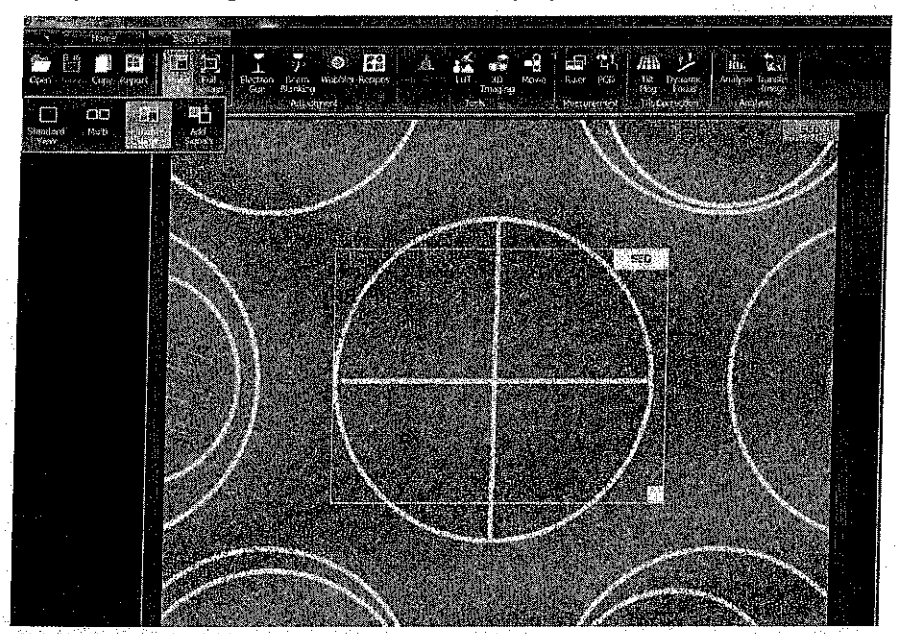
Tapping the Back button in the upper right of the screen displays back the window prior to the enlargement.



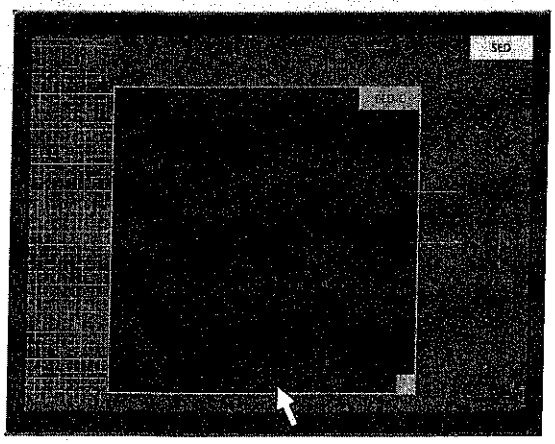
4.4.2 Dividing and displaying an observation image in different signal domains

(Flexible window function)
Arbitrary rectangular frames can be provided in the observation window to display images in the frames with different signals.

1. Tap the Mode icon from Home and then the Flexible View icon.
   A rectangular frame is displayed at the center of the main screen.
   The photo data signals are named and displayed as "FXI."

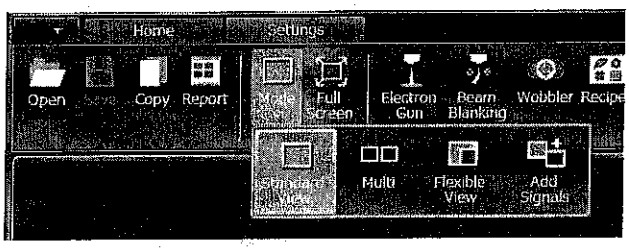


Dragging the corner (■) of the flexible window changes the frame size.
Dragging the inside of the frame displaces the frame.



2. Select a signal inside the rectangular frame to adjust the brightness.
Select the flexible window frame, and tap a signal of the photo data to select the signal. ⇒ See 3.8.1.
Adjust the brightness of the image as desired. ⇒ See 3.8.5.

3. Terminate the flexible window display.
Tap the Mode icon from Home and then the Standard View icon.



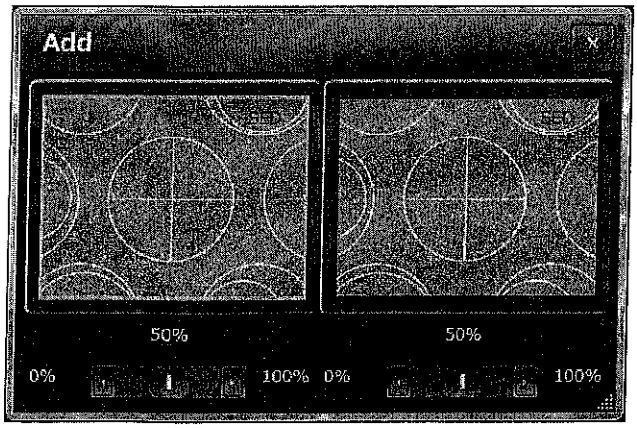
In vision change operation, the click center functions only in the selection window.
SEI and REF images can be displayed when the secondary electron detector alone is mounted.
If no detector except a reflection electron detector (BED) is mounted, the BEI signal displayed when switching is made to low vacuum (LV) mode is displayed in full window.

4.4.3 Displaying an image by mixing two signals

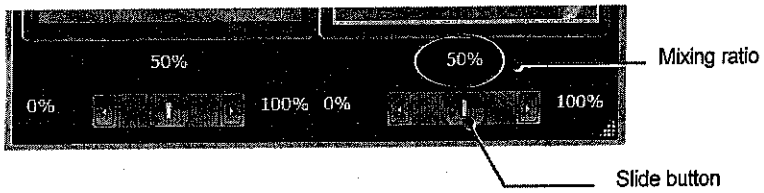
(Signal addition image)
Two arbitrary signals can be summed and the result can be displayed in the standard window.

1. Tap the Mode icon from Home and then the Add Signals icon.
   The signal addition window is displayed and an image resultant from signal addition is displayed in the main window.
   The photo data signals are named and displayed as "ADD."

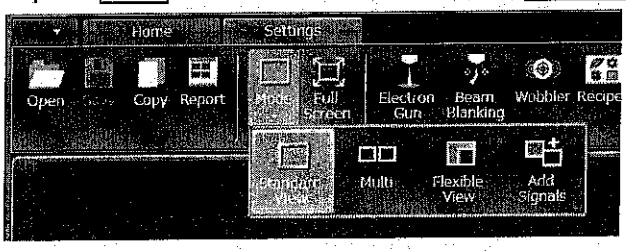
2. Select signals in the signal 1/2 window to adjust the brightness.
   Select either Left or Right in the signal addition window (the illustration below shows a selection of Right).
   Tap and select signals of the photo data, and adjust the brightness. ⇒ See 3.8.1 and 3.8.5.



3. Adjust the mixing ratio of respective signals by using the slide button.
The mixing ratio is displayed in the upper middle of the slide bar and the adjustment result is reflected to the main window.



4. Terminate the signal addition display.
Tap the Mode icon from Home and then the Standard View icon.

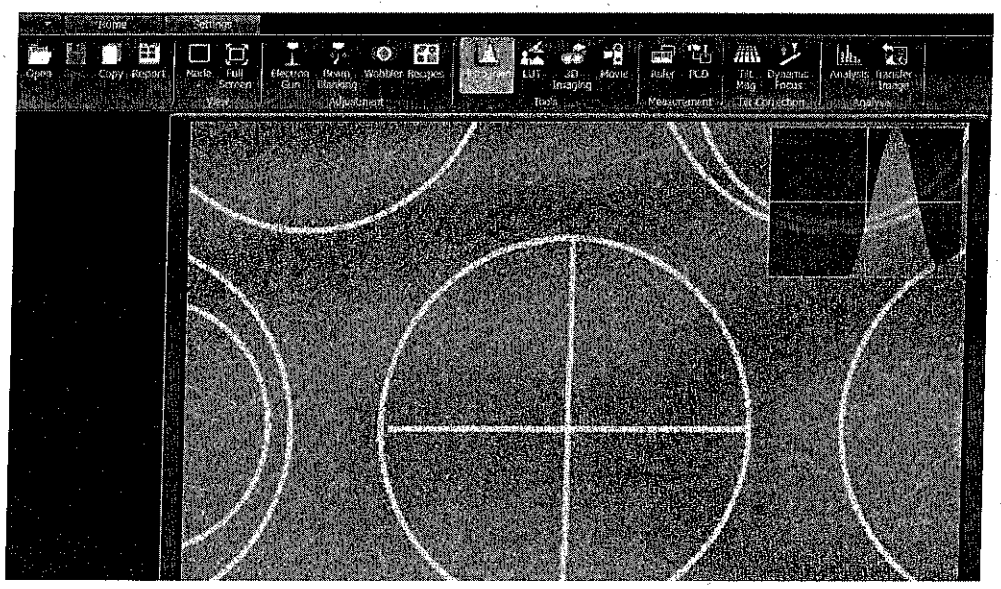


Case of no detector other than BED being mounted:
When switching to the LV mode with signal addition being displayed, all three windows display BEI signals and the signal addition display is terminated.

4.4.4 Displaying a histogram

The illuminance histogram of the observation image can be displayed.

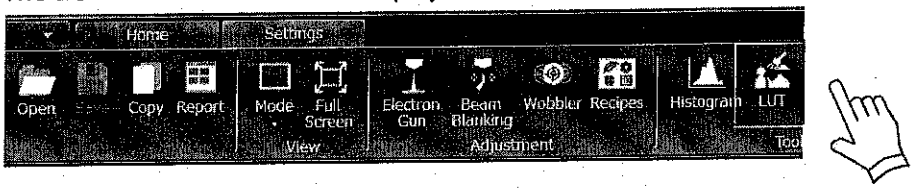
1. Tap the Histogram icon from Home.
   The histogram of the observation image is displayed on the upper right of the main screen.
   * Tap the Histogram icon again to terminate the histogram display.



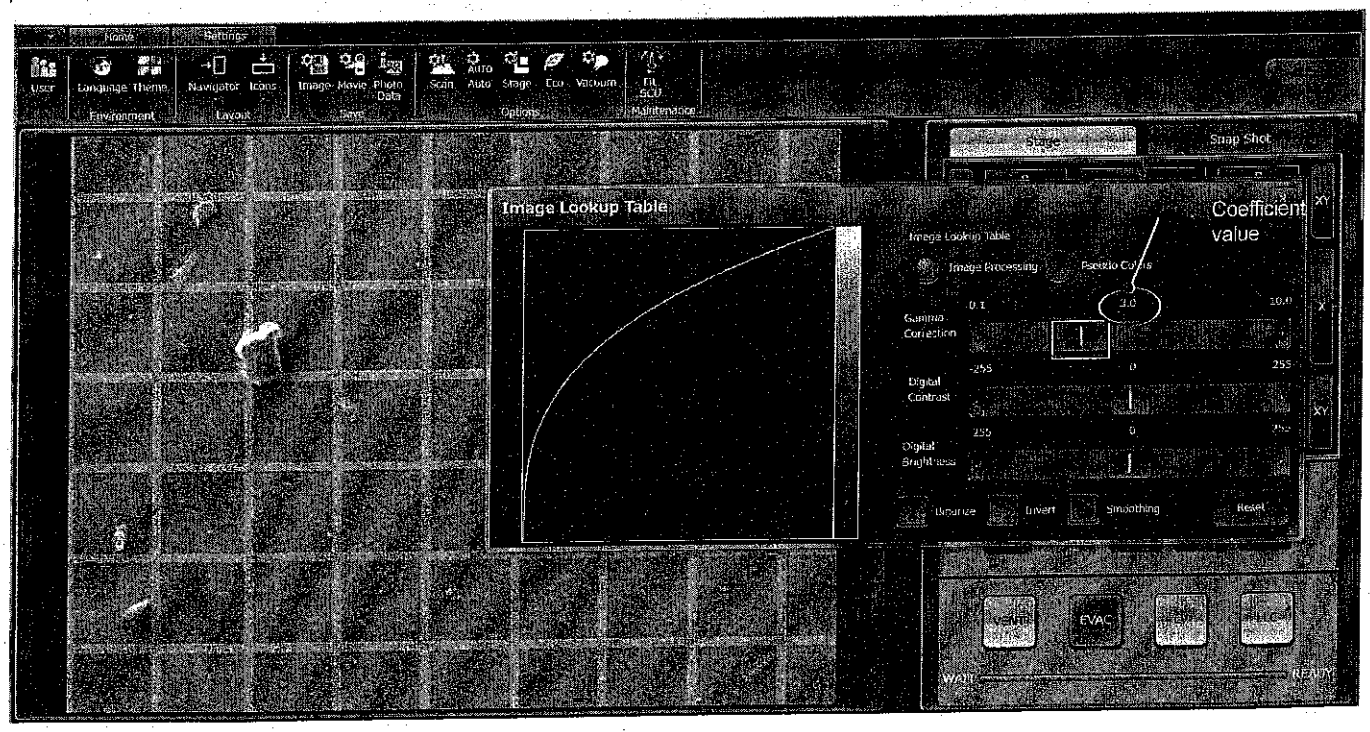
4.4.5 Adjusting digital images of the observation window

The following functions of image adjustment can be utilized with the digital image adjustment function: (Gamma correction, digital contrast, digital brightness, binarization, illuminance inversion, and noise mitigation)

1. Tap the LUT icon from Home.
   The LUT correction window is displayed.



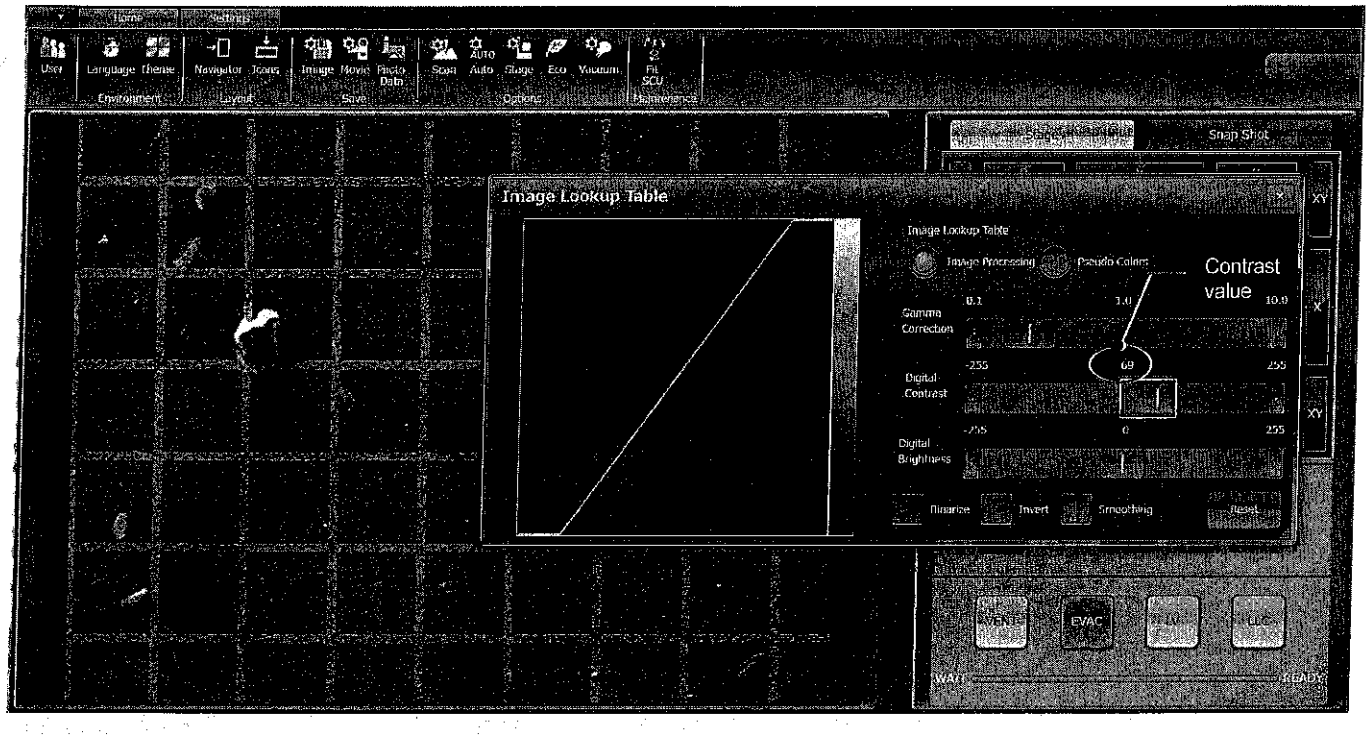
2. Select Image Processing of Image Lookup Table and conduct image adjustment.
   Case of conducting gamma correction:
   Drag the slide button and adjust the gamma correction coefficient.
   The adjusted coefficient is displayed in the upper middle of the slide bar.
   The observation image is automatically gamma-corrected.
   To turn off the gamma correction, tap the Reset button.



Case of conducting digital contrast correction:

Drag the slide button and adjust the contrast value.

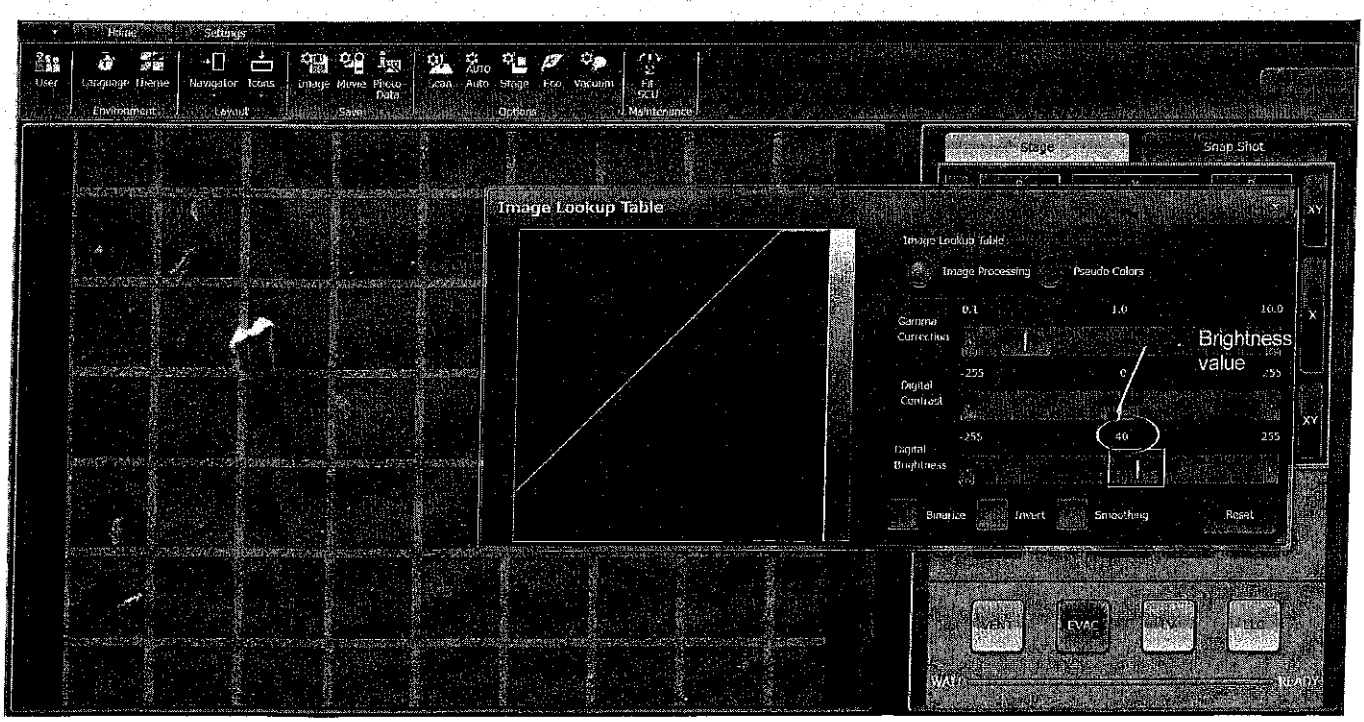
The adjusted contrast value is displayed in the upper middle of the slide bar. The observation image is automatically corrected with digital contrast. To turn off the digital contrast correction, tap the Reset button.



Case of conducting digital brightness correction:

Drag the slide button and adjust the brightness value.

The adjusted brightness value is displayed in the upper middle of the slide bar. The observation image is automatically corrected with digital brightness. To turn off the digital brightness correction, tap the Reset button.

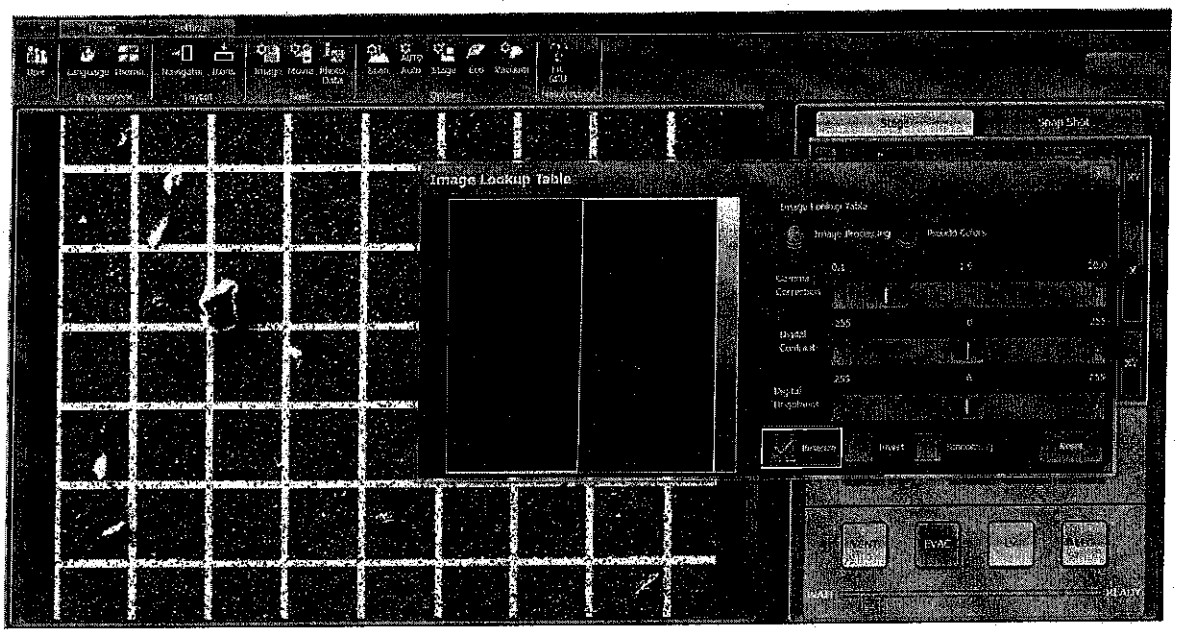


Case of conducting binarization:

Check Binarize.

The observation image is automatically binarized.

To turn off the binarization, uncheck the check mark or tap the Reset button.

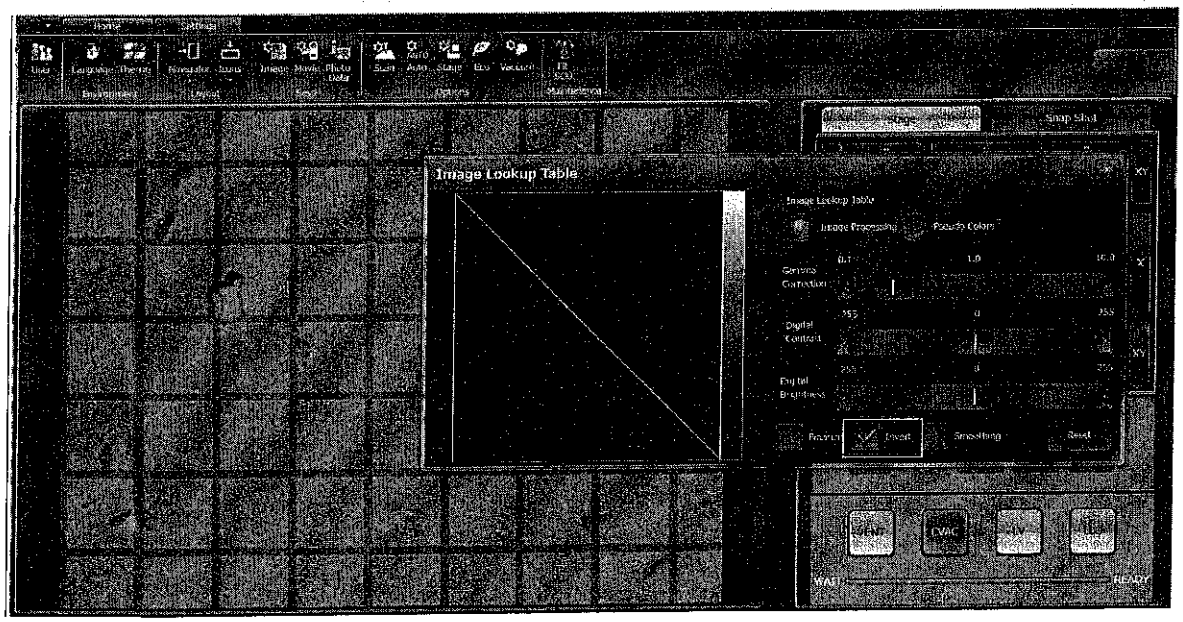


Case of conducting illuminance inversion:

Check Invert.

The illuminance of the observation image is automatically inversed.

To turn off the illuminance inversion, uncheck the check mark or tap the Reset button.

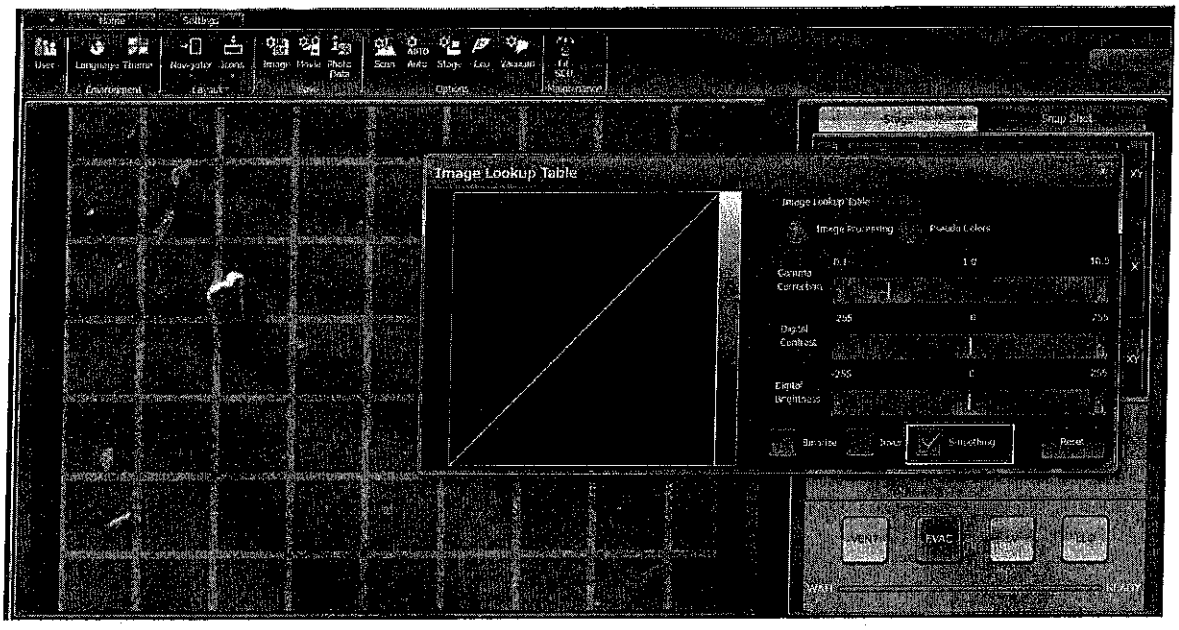


Case of smoothing the image:

Check Smoothing.

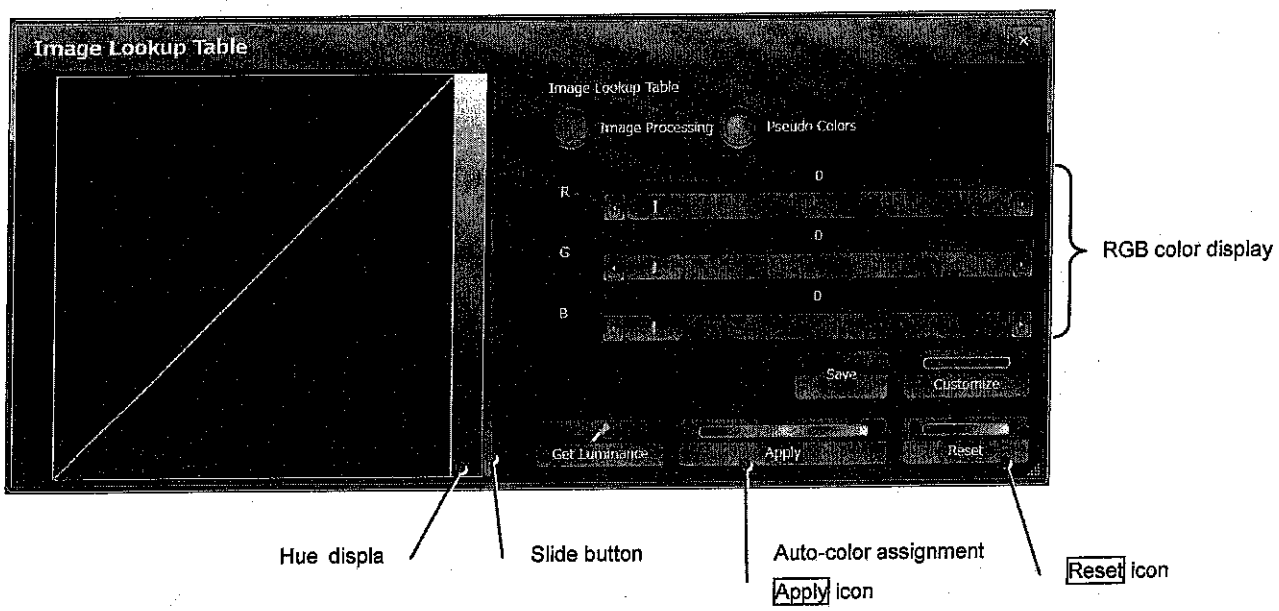
The smoothing is automatically applied to the observation image.

To turn off the smoothing, uncheck the check mark or tap the Reset button.



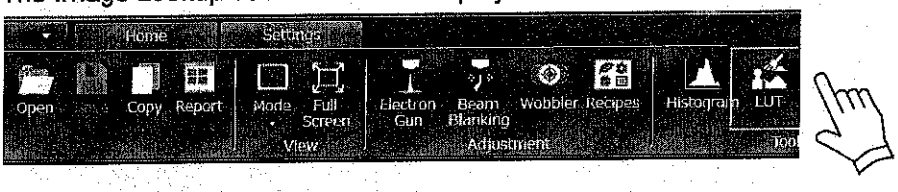
4.4.6 Displaying an observation image in pseudo colors

The structural image can be emphasized by displaying it in colors.
For displaying an image in pseudo colors, operate the following windows and assign preferred colors to respective illuminance gradations of the gray scale.

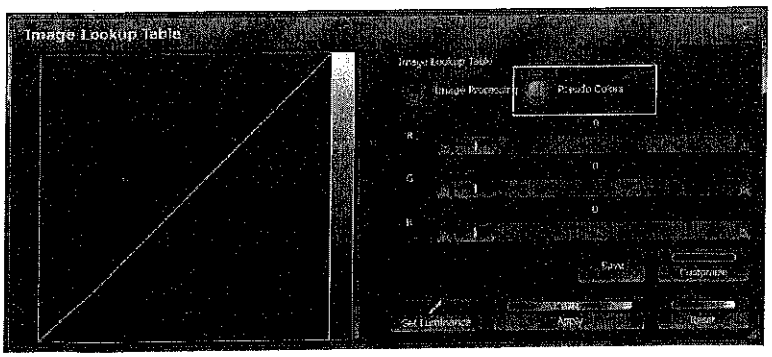


4.4.6.a Case of manually setting the color assignment

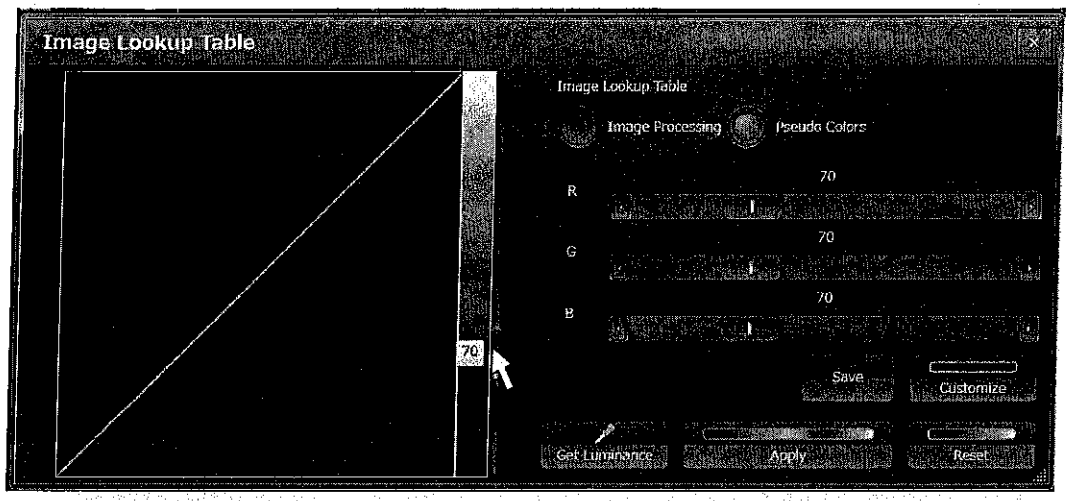
1. Tap the LUT icon from Home.
   The Image Lookup Table window is displayed.



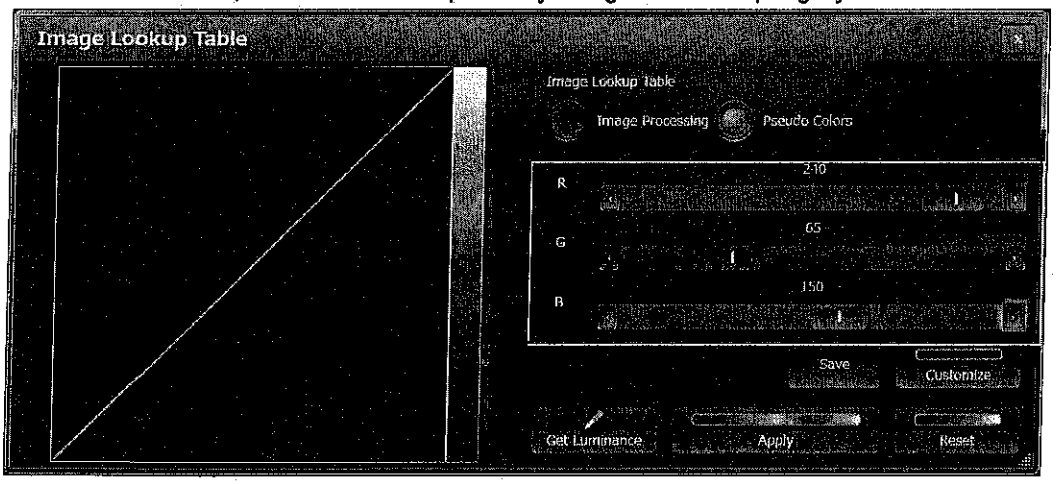
2. Select Pseudo Colors of tone correction.



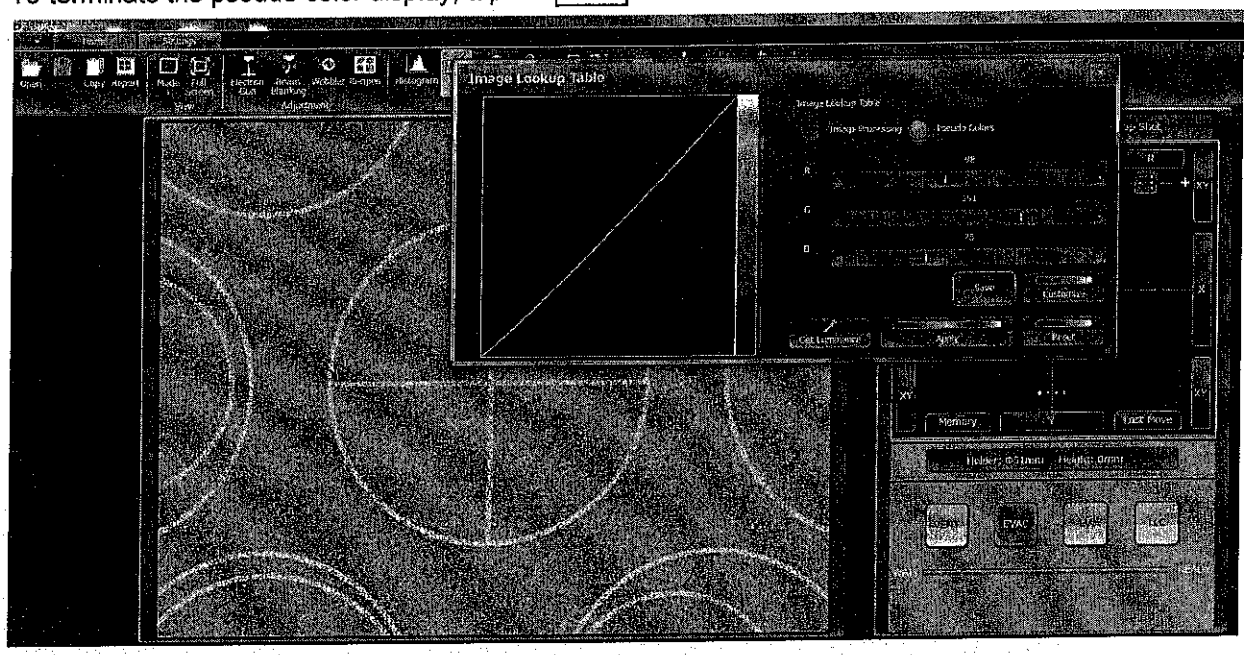
3. Drag the slide button located at the right of the hue display to select an illuminance gradation subject to color assignment.
The following illustrates the case of assigning colors for the illuminance gradation of 70 (0 to 255) on the gray scale.
The RGB color display is all 70 because of the gray scale.



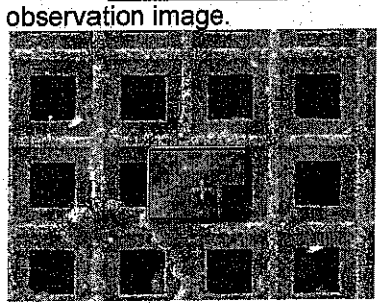
4. Adjust the mixing ratio of RGB to assign preferred colors.
In a similar manner, colors can be respectively assigned to multiple gray scale illuminance gradations.



5. Upon completing the color assignment, the observation window is displayed in pseudo colors.
To terminate the pseudo color display, tap the Reset button.



- The illuminance gradation of the gray scale can be specified from the observation image by using the illuminance extraction function.
  Tap the Get Luminance icon and specify the illuminance gradation of the gray scale from the observation image.

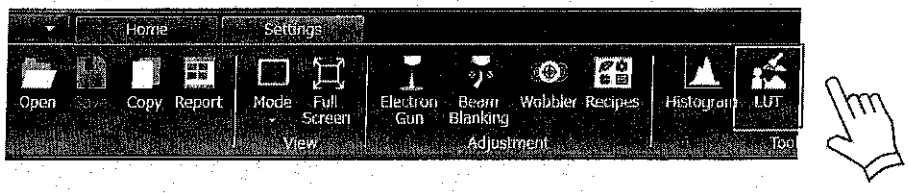


- The assignment of the prepared colors (customized colors) can be saved.
  Tap the Save button to save as the assignment of customized colors.

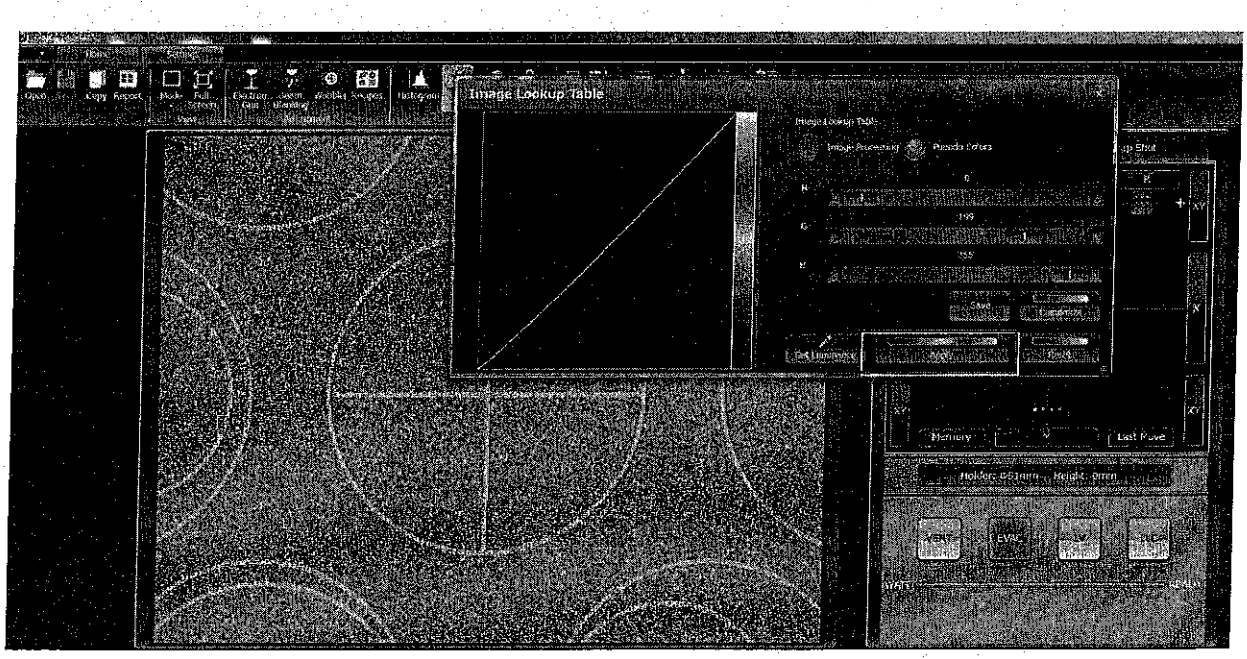
To apply the customized color assignment, tap the Customize icon.

4.4.6.b Case of automatically setting color assignment

1. Tap the LUT icon and of tone correction.
   The Image Lookup Table window is displayed.



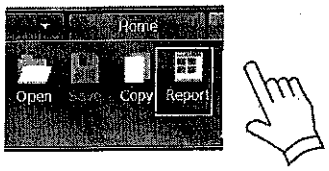
2. Select Pseudo Color and tap the Apply icon of the automatic color assignment.
   A pseudo color image applied with the automatic color assignment is displayed.
   To terminate the pseudo color display, tap the Reset icon.



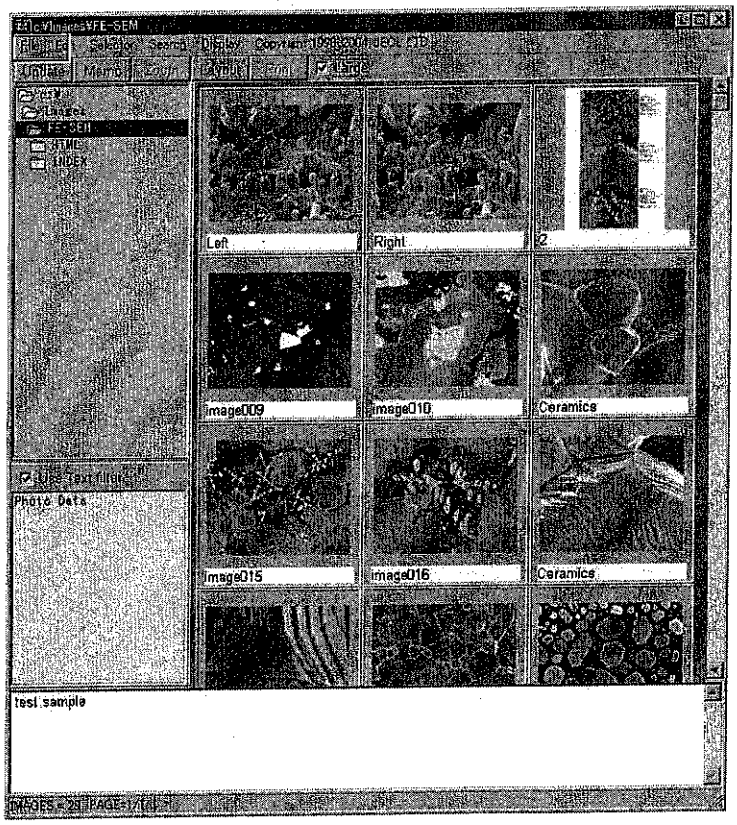
4.5 PREPARING A REPORTS

Using the report preparation software "SMile View" enables easy preparation of a report.
This section describes simple operation method of SMile View. For detailed information, see Chapter 6, "Preparation of Reports."

1. Tap the Report icon from Home.
   The report preparation software SMile View starts and the image list window is displayed.

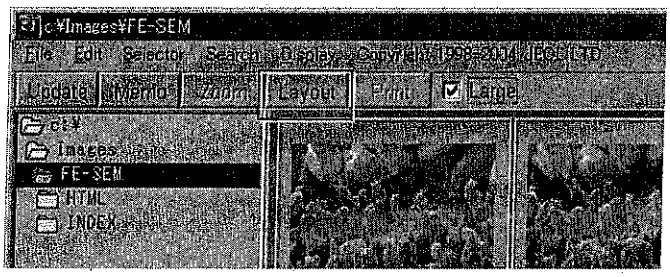


2. In the image list window, select File → Open on the menu bar.
   The image file list in the folder where the specified file exists is displayed.

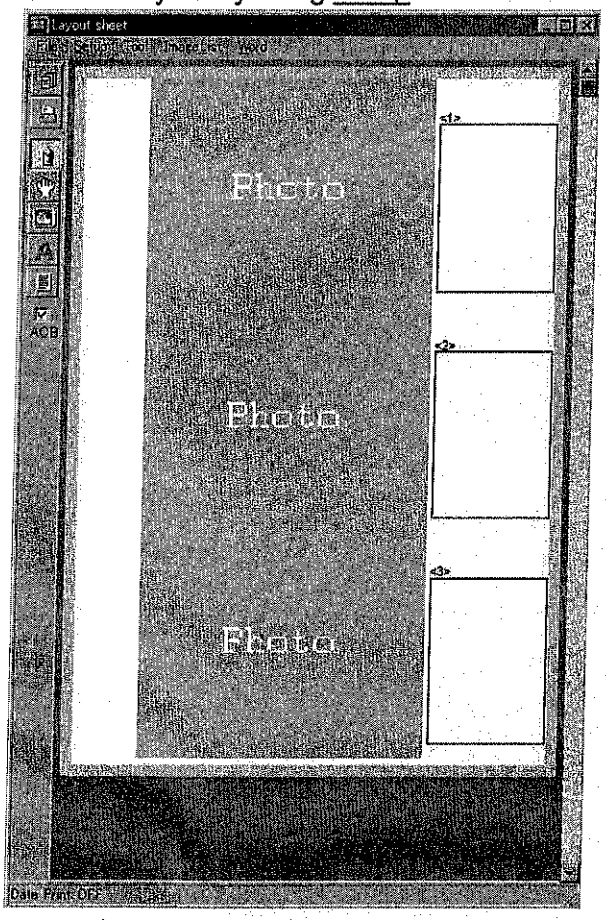


Index- image screen

3. Tap the Rayout button in the image list window.
The layout sheet window is displayed.

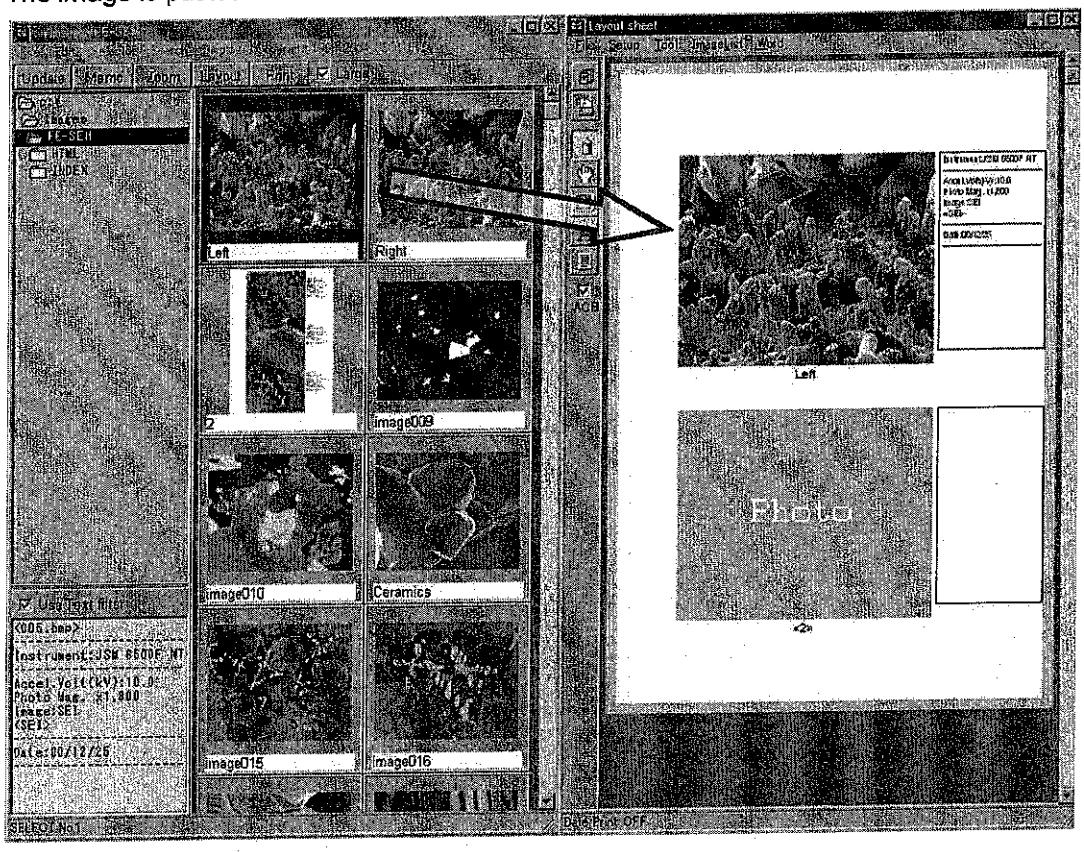


4. Select a layout by using Setup on the menu bar of the layout sheet window.



Example) Case of selecting 3 images

5. Drag the image in the image list onto the layout sheet.
The image is pasted and the observation conditions are written next to the pasted image.



6. Print or save the report.

Print

a. Select File ⇒ Print on the menu bar of the layout sheet.
b. Tap the Print button in the print window.
A report (image + observation conditions) is printed.

Save

a. Select File ⇒ Save as on the menu bar of the layout sheet.
b. Select one of the following as save format:

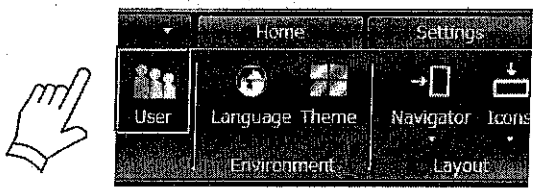
Layout File(＊.lay) :	Enables rewrite on the report.
JPEG(90dpi for Web) File (＊.jpg) :	Entirely saves in the JPEG format equivalent to the image quality of 90 dpi.
BMP(90dpi) (＊.bmp) :	Entirely saves in the bitmap format equivalent to the image quality of 90 dpi.

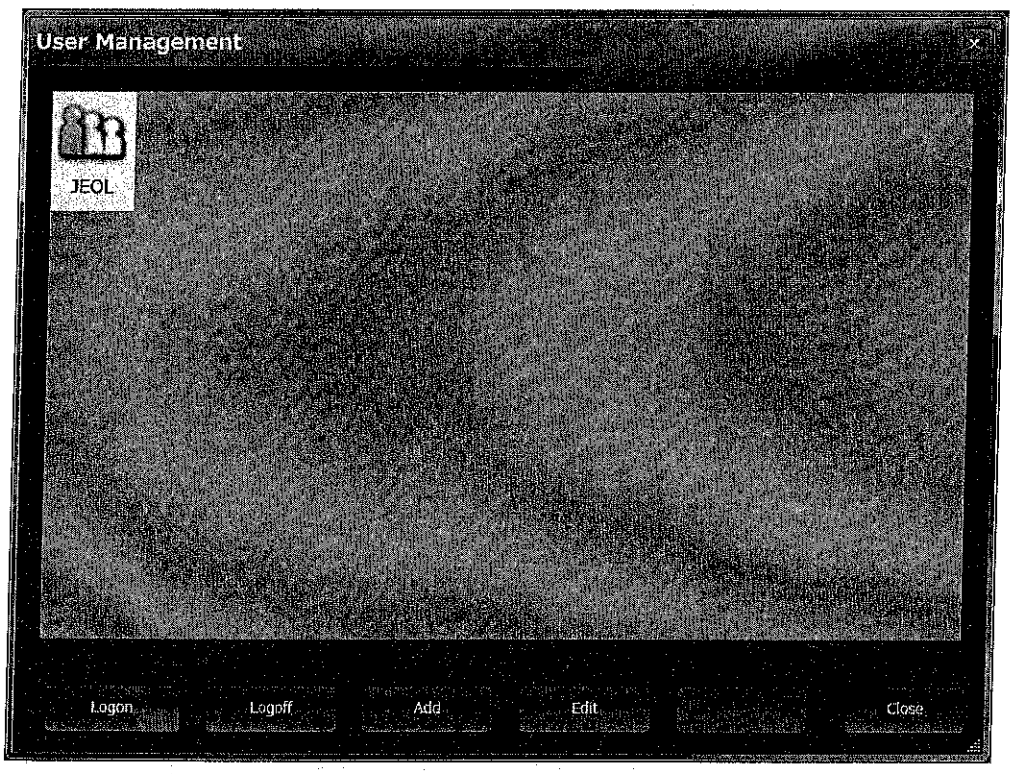
c. Select a save destination and click the Save button.

4.6 USER MANAGEMENT

4.6.1 User log-on and log-off

1. Tap the User icon from Settings.
   The User Management window is displayed. (The following illustrates the initial state.)

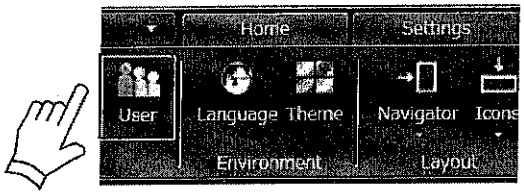




2. Upon selecting a user, tap the Logon (or Logoff) button.

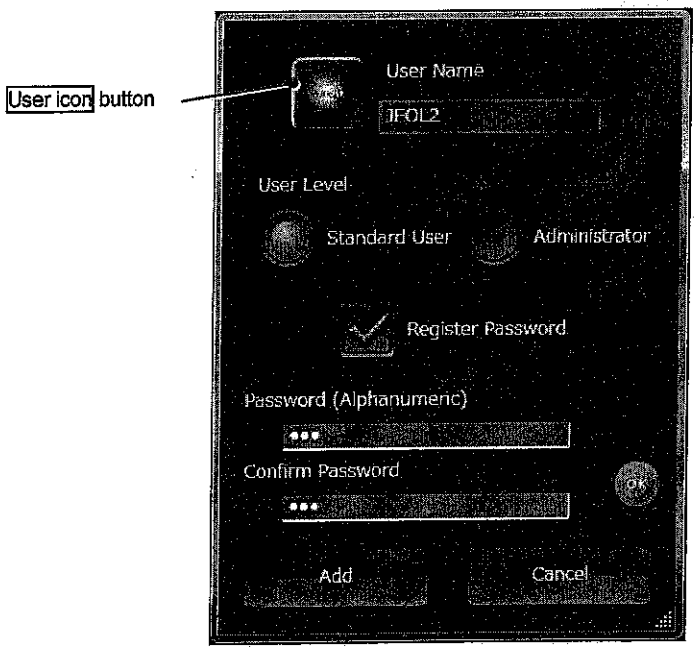
4.6.2 Adding a user

1. Tap the User icon from Setting.
   The User Management window is displayed.



2. Tap the Add button.
   The user add window is displayed.

3. Enter a user name and select User Level.
4. Check Register Password, enter the password, and tap the Add button.
   Password registration depends on user's desire.
   When a user having a registered password attempts log-on, entering the password is required.
   A user icon can be registered from the User Icon button. Set an image file used for the icon as preferred.

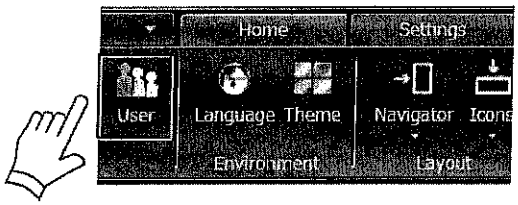


Regarding user level

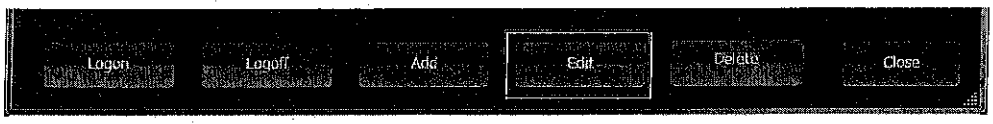
- Standard user: Has no authority to add or delete a user. Also has no authority to execute editing users except himself/herself.
- Administrator: A user having the authority to execute addition, editing and deletion of users

4.6.3 Editing users

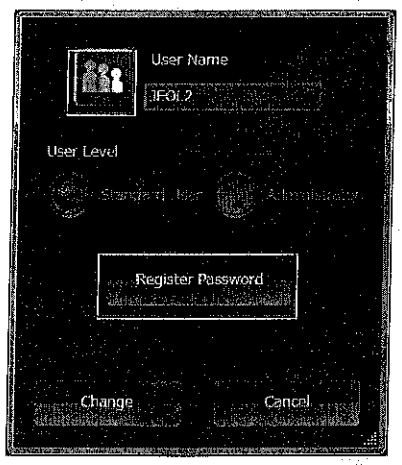
1. Tap the User icon from Setting.
   The User Management window is displayed.



2. Upon selecting a user desired to edit, tap the Edit button.
   The user edit window is displayed.

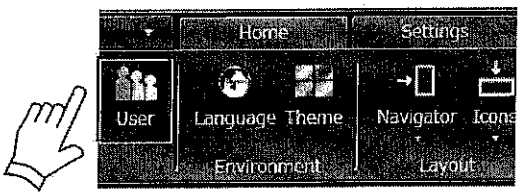


3. Change the password and/or user icon, and tap the Change button.

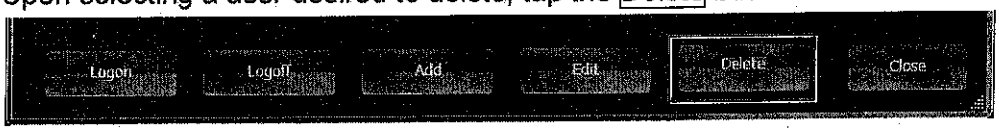


4.6.4 Deleting users

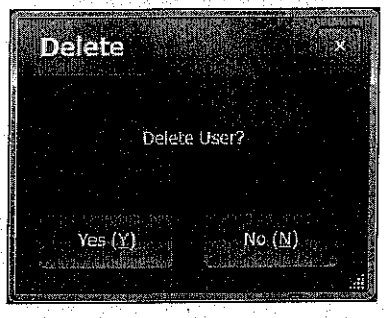
1. Tap the User icon from Settings.
   The User Management window is displayed.



2. Upon selecting a user desired to delete, tap the Delete button.



3. The following message appears, tap the Yes button.

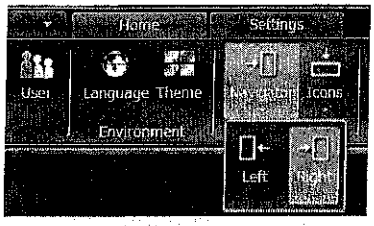


4.7 USER SETTING (CUSTOMIZATION)

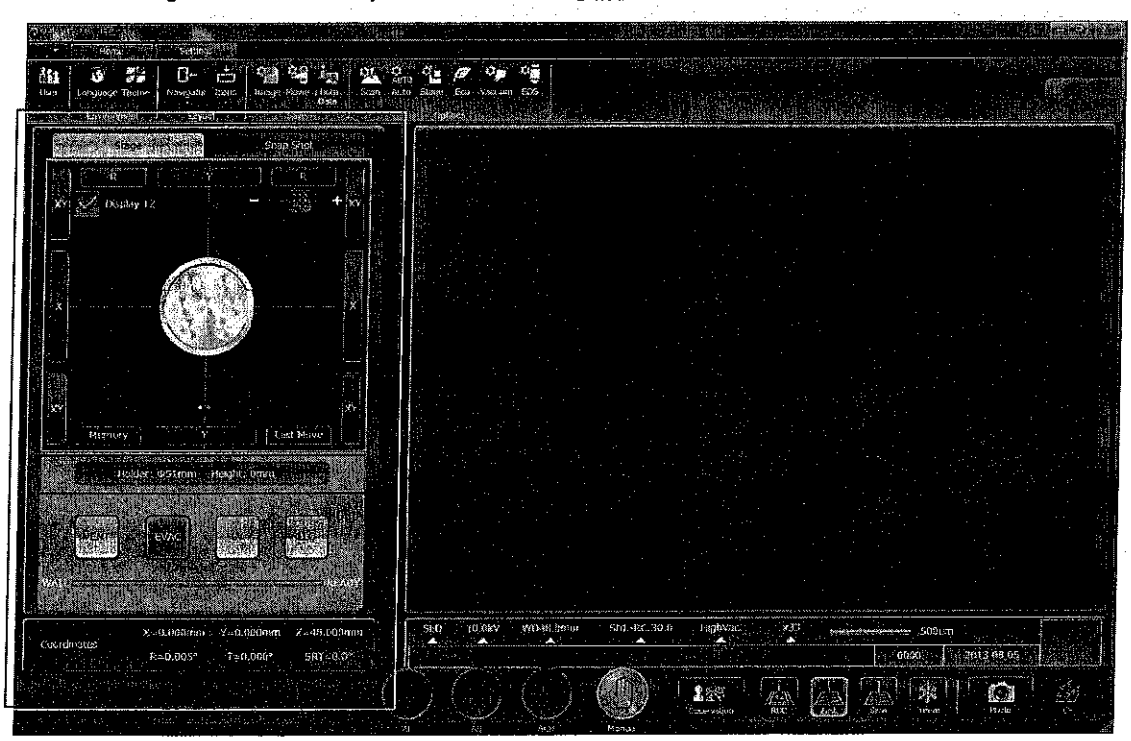
4.7.1 Changing the layout of the UI window

4.7.1.a Case of transposing Right and Left of the navigator

1. Tap the Navigator icon from Setting and then either of the Left or Right icon.

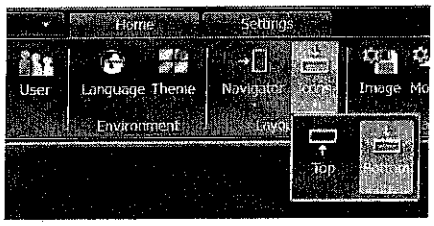


2. The location of the navigator area switches.
   The following illustrates the layout after selecting Left.

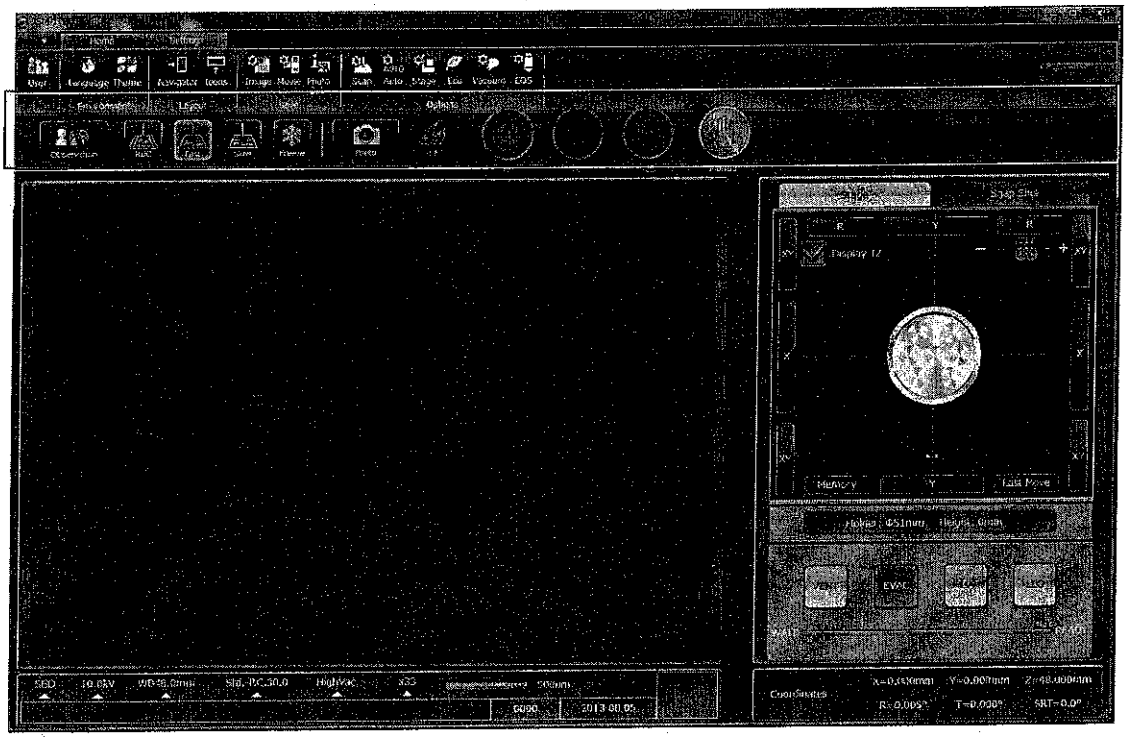


4.7.1.b Case of transposing Top and Bottom of the fixation icons

1. Tap the Icons icon from Setting and then either of the Top or Bottom icon.

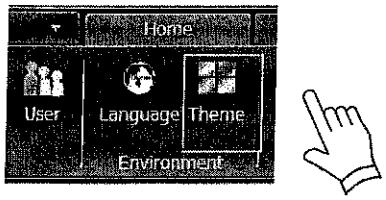


2. The location of the fixation icon switches.
The following illustrates the layout after selecting Top.

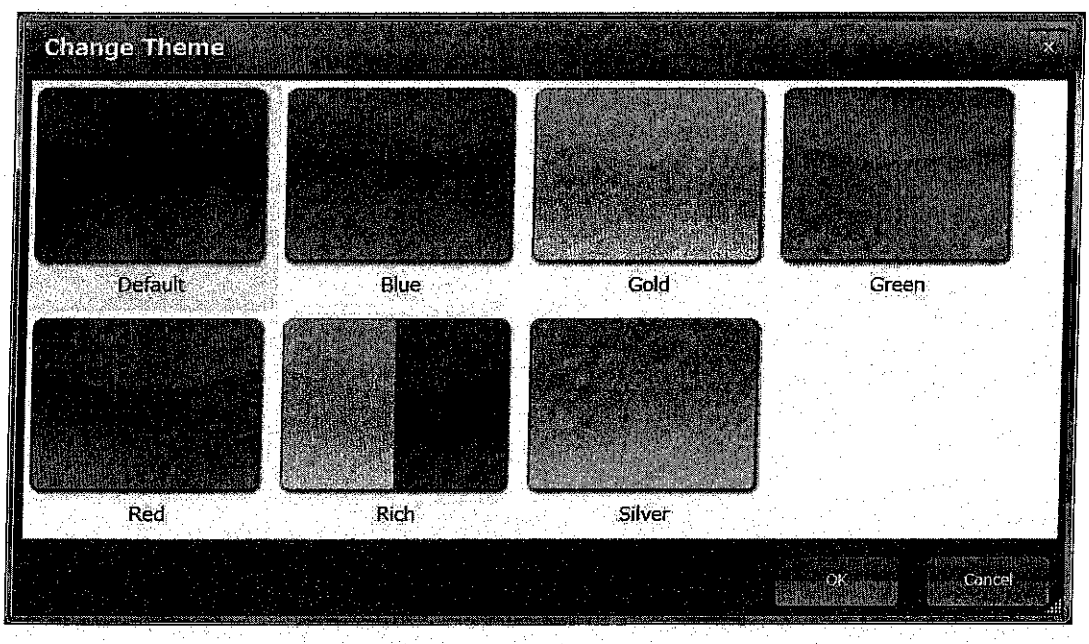


4.7.2 Changing the theme of UI

1. Tap the Theme icon from Settings.
   The Change Theme window is displayed.



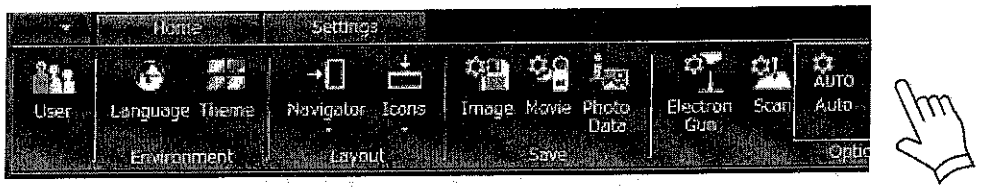
2. Tap the desired color and then the OK button.
   The UI color entirely changes.



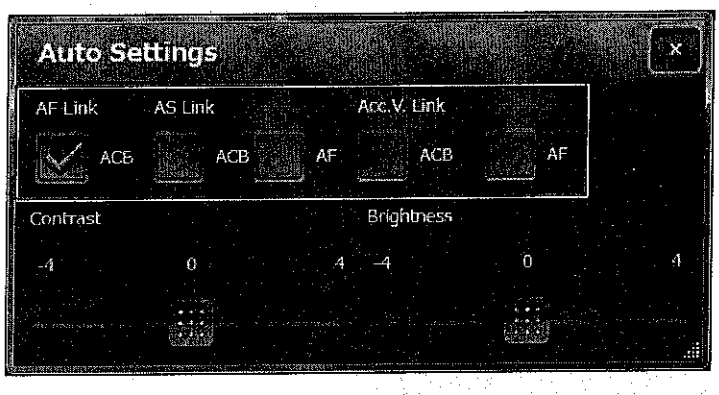
4.7.3 Setting the auto-function

4.7.3.a Setting links of the auto-function

1. Tap the Auto icon from Settings.
   The Auto Settings window is displayed.



2. Check respective checkboxes as needed.



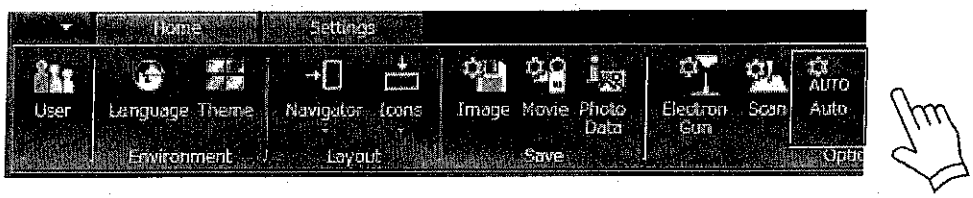
Case of checking the checkbox

AF Link - ACB: Upon tapping the AF icon, ACB is also executed simultaneously.
AS Link – ACB/AF: Upon tapping the AS icon, ACB/AF is also executed simultaneously.
Acc.V. Link - ACB/AF: Upon switching the acceleration voltage, ACB/AF is simultaneously function.

4.7.3.b Setting the effectivity level of ACB

The effectivity level of contrast and brightness when executing ACB can be adjusted.

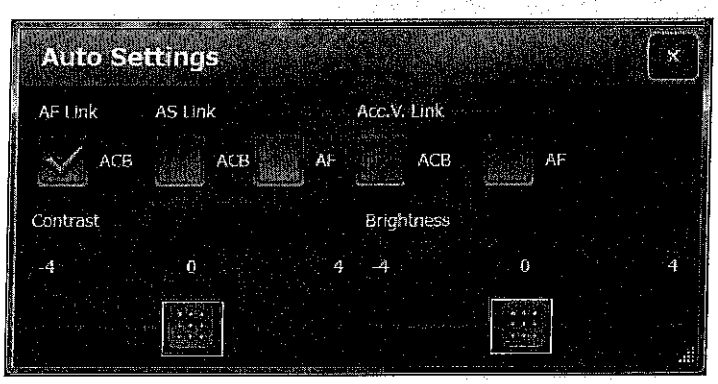
1. Tap the Auto icon from Settings.
   The Auto Settings window is displayed.



2. Dragging corresponding slide button adjusts the contrast or brightness.
   Both contrast and brightness are adjustable within the range of [–4 to +4].
   Adjusted values are displayed in the upper middle of the slide bar.

   Contrast adjustment: Using "+" and "–" results in the contrast being sharper and duller, respectively.

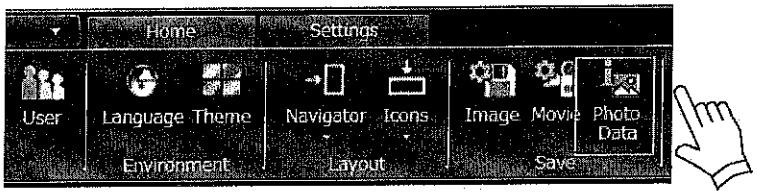
   Brightness adjustment: Using "+" and "–" results in the brightness being brighter and darker, respectively.



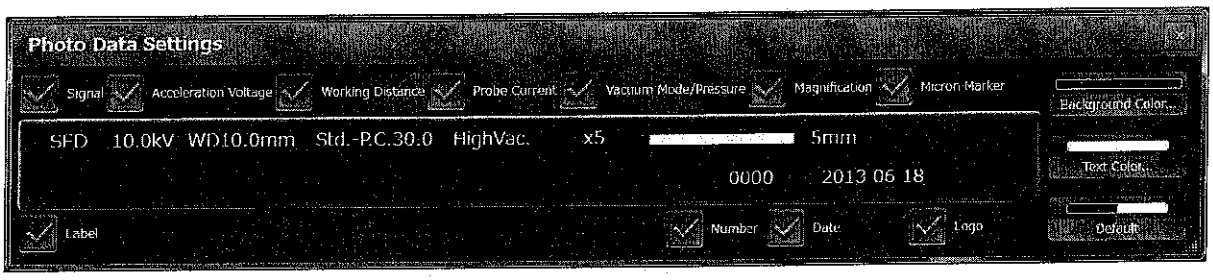
4.7.4 Setting the display for photo data

4.7.4.a Setting turn-on/off of photo data display items

1. Tap the Photo Data icon from Settings.
   The Photo Data Settings window is displayed.

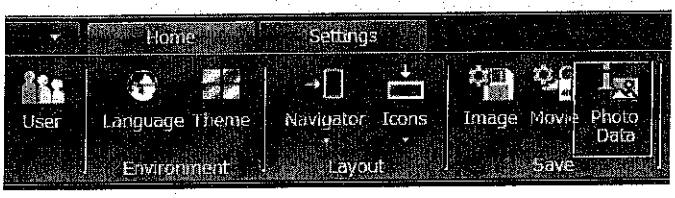


2. Uncheck the check mark of the items not to be displayed.
   Unchecked data is not simultaneously saved when saving images.

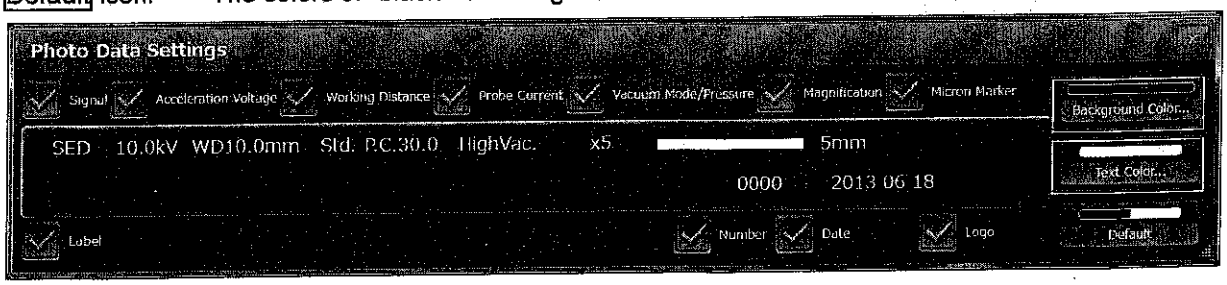


4.7.4.b Changing the character and background colors of photo data.

1. Tap the Photo Data icon from Settings.
   The Photo Data Settings window is displayed.



2. Tap the Background Color and Text Color icons to select background and character colors.
   The background and text colors selected are set.
   Default icon: The colors of "black" for background and "white" for text are set as default.



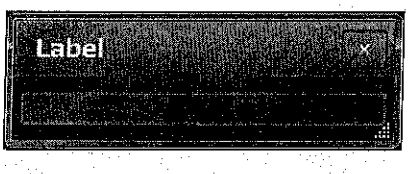
4.7.5 Editing photo data

4.7.5.a Editing the label

A text can be entered into the label field of photo data.

1. Tap Label Area of photo data.
   The Label window is displayed.

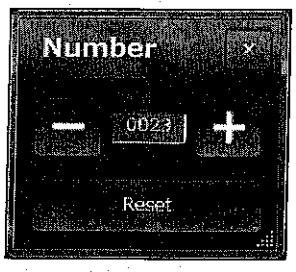
2. Enter a text in the label window and press the Enter key.



4.7.5.b Editing the photo number

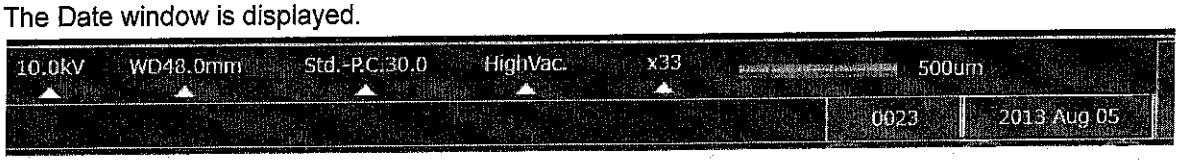
1. Tap Photo Number Area of photo data.
   The Number window is displayed.

2. Set a number.
   + button: Counts up.
   − button: Counts down.
   Reset button: Sets to "0000."

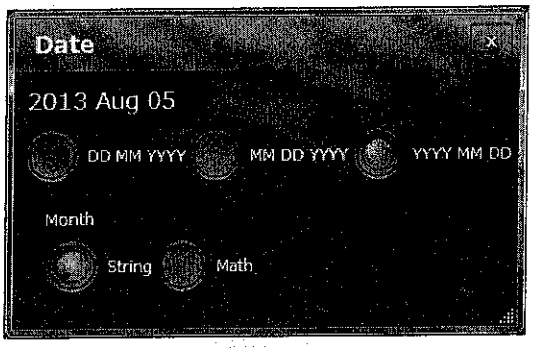


4.7.5.c Setting the display of date

1. Tap Date Area of photo data.
   The Date window is displayed.



2. Select a display method of date.

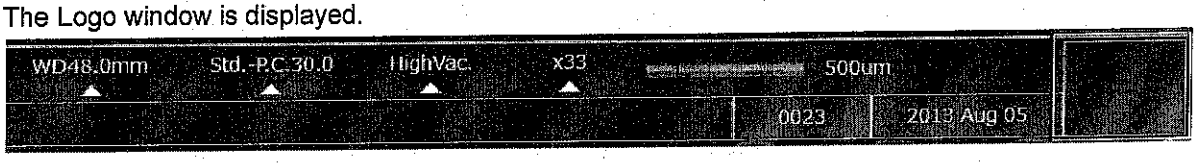


Sequence of year, month and day
dd.MM.yyyy: 05.08.2013
MM.dd.yyyy: 08.05.2013
yyyy.MM.dd: 2013.08.05

Display of month
String: 2013.Aug.05
Math: 2013.08.05

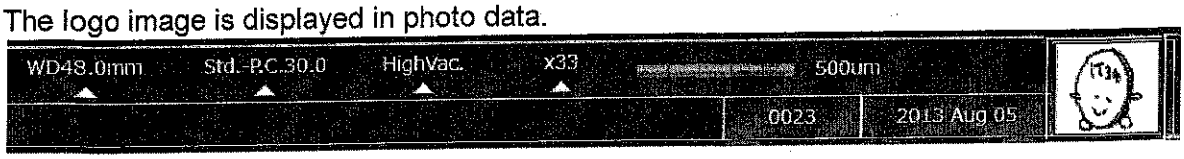
4.7.5.d Changing the logo image

1. Tap Logo Area of photo data.
   The Logo window is displayed.



2. Tap the Change button in the logo setting window and select an image file.
   Tapping the Delete button deletes the logo image.

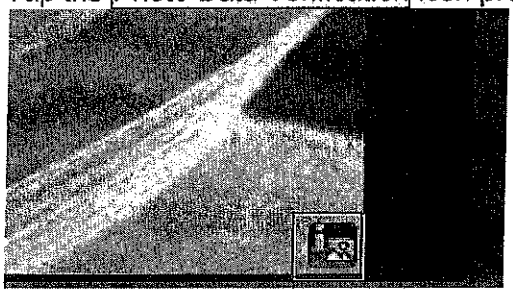
3. The logo image is displayed in photo data.



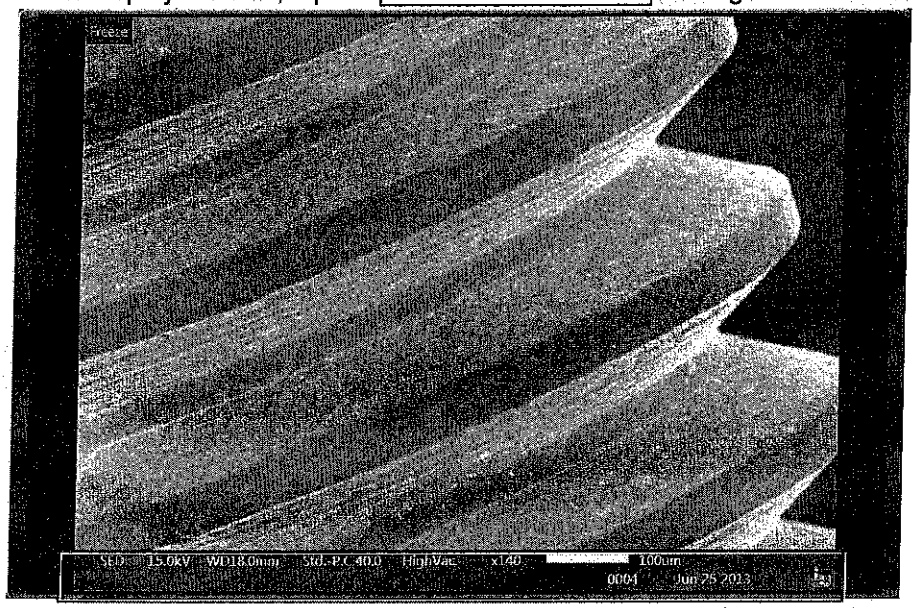
4.7.6 Verifying photo data on the observation image

Photo data appended to the image data can be verified on UI when saving the images.

1. Freeze the observation image.
2. Tap the Photo Data Verification icon provided on the lower right of the observation image.



3. Photo data is displayed at the bottom of the observation image.
   Not to display the data, tap the Photo Data Verification icon again.

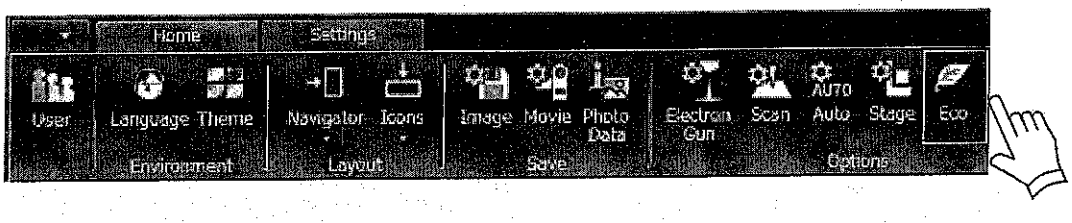


4.7.7 Constraining power consumption of the equipment

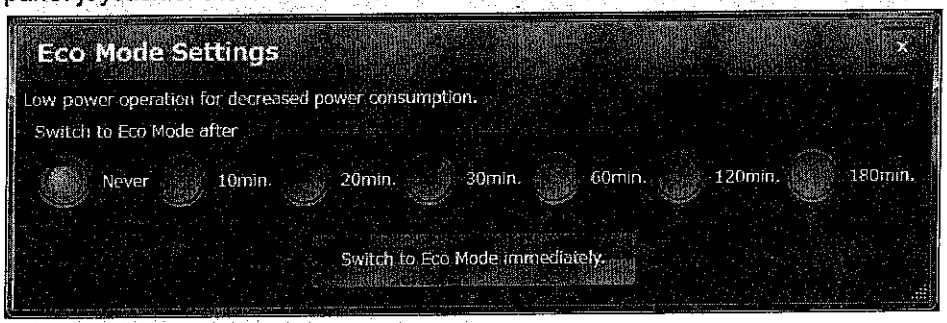
(Eco-mode function)
Power consumption is constrained when setting the system to standby status.
Manual and automatic methods are available for establishing standby status (the latter requires time setting).

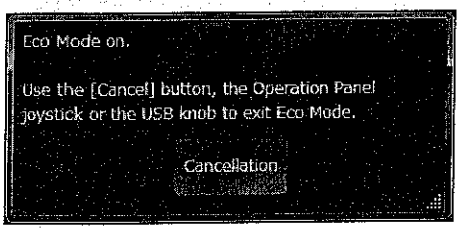
4.7.7.a Manually establishing the standby status

1. Tap the Eco icon from Settings.
   The Eco Mode Settings window is displayed.



2. Tap the Switch to Eco Mode immediately button.
   The system changes to standby status and the window for release is displayed.
   To release the standby status, tap the Cancellation button or conduct operation from the operation panel joystick or the USB knob.



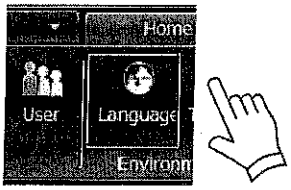


4.7.7.b Automatically setting the standby status through time setting

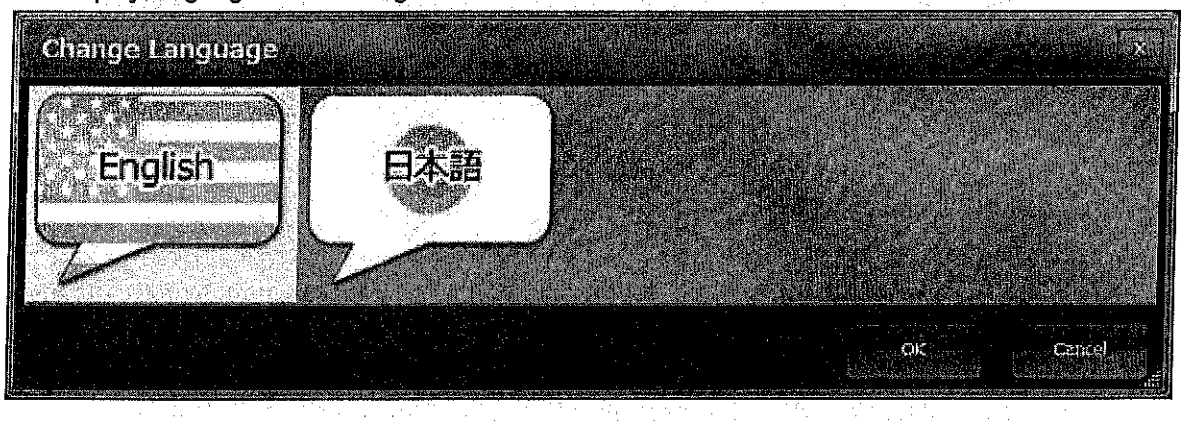
1. Tap the Eco icon from Settings.
2. Choose the Switch to Eco Mode after (10, 20, 30, 60, 120 or 180min.).
3. In case no operation is conducted for the set time, the system automatically changes to standby status.

4.7.8 Switching the display language

1. Tap the Language icon from Setting.
   The Change Language window is displayed.



2. Select the English or 日本語 icon, and tap the OK button.
   The display language on UI changes.



4.8 X-RAY ANALYSIS USING EDS

On the models JSM-IT300A and IT300LA, efficient EDS analysis is enabled by jointly using SEM software and EDS software (as the analysis station). The following describes the EDS analysis method executable from GUI of SEM:
For detailed information of the EDS analysis, see the operating manual of the EDS detector.

he following analyses listed in the table below are possible on this equipment:

Type	Purpose
Point analysis	Executes spectrum collection of point locations set on the image.
Line analysis	Executes spectrum collection on the line set on the image.
Area analysis	Executes spectrum collection within the area (rectangular domain) set on the image.
Mapping	Executes all elements mapping of the entire area of an observation image.
Successive analysis	Successively executes spectrum collection of the locations reserved in the point and area analyses.

◆ **CAUTION** ◆

- **The reservation of spectrum collection, setting an analysis point/line/area, or successive analysis is not possible for the following cases:**

  RDC scan

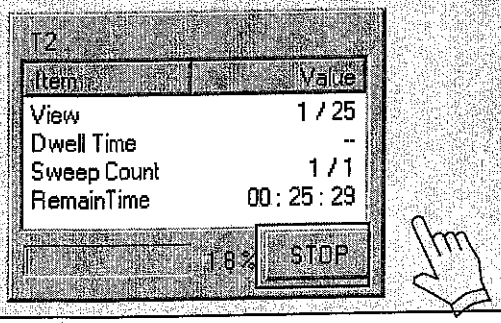
  Image file display

- **Throughput of spectrum collection drops unless the working distance is set at 10 mm.**

  Set the working distance at 10 mm to execute an analysis.

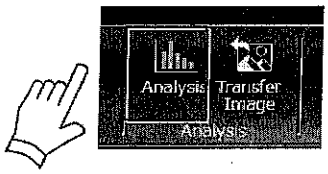
- **Once an analysis starts, image display freezes and SEM operation is disabled.**

  When desiring to halt the analysis for operating SEM, tap the STOP button of the monitoring dialog.

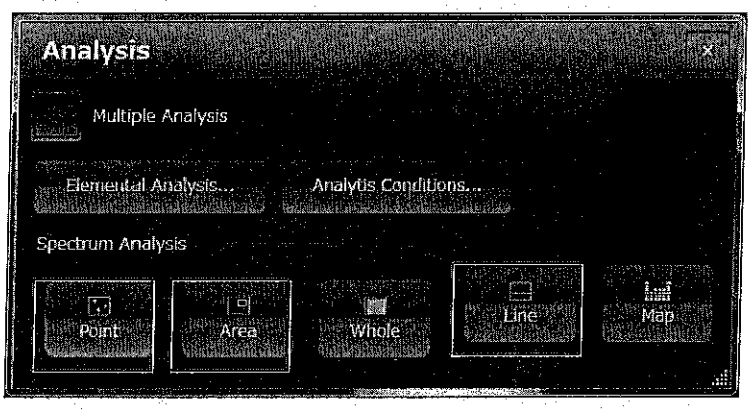


4.8.1 Spot, line and area analysis

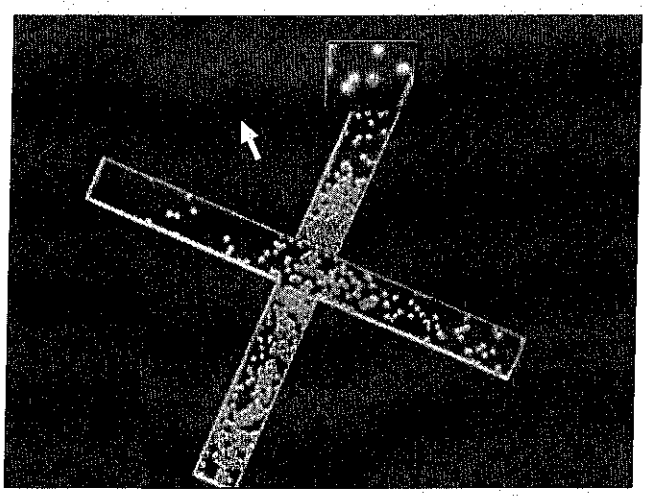
1. Tap the Analysis icon from Home.
   The Analysis window is displayed.



2. Tap the Point or (Line or Area) icon.
3. Specify a location to be analyzed in the main window.
   Upon specifying the location, the image is automatically brought in the analysis station and the analysis starts.



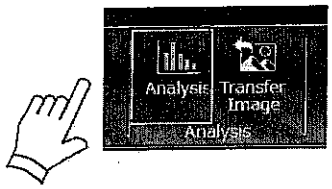
The following illustration is for the case of specifying a location for point analysis:



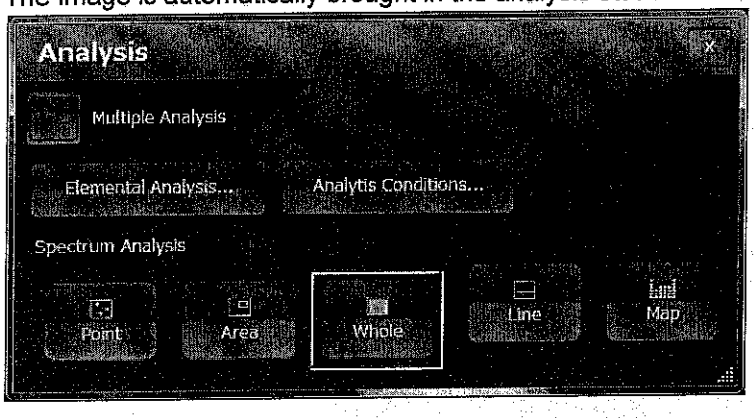
4. Point (or line or area) analysis is executed and the spectrum analysis result is displayed.
   The following shows the result of executing a point analysis.
   For detailed information, see the operating manual of the EDS detector.
   Upon completing the analysis, SEM UI accepts operation. Release the freeze to operate SEM.

4.8.2 Whole area analysis

1. Tap the Analysis icon from Home.
   The Analysis window is displayed.



2. Tap the Whole icon.
   The image is automatically brought in the analysis station and the analysis starts.

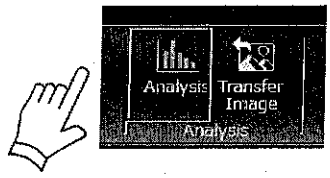


3. The whole area analysis is executed and the spectrum analysis result is displayed.
   Upon completing the analysis, SEM UI accepts operation. Release the freeze to operate SEM.
   For detailed information, see the operating manual of the EDS detector.

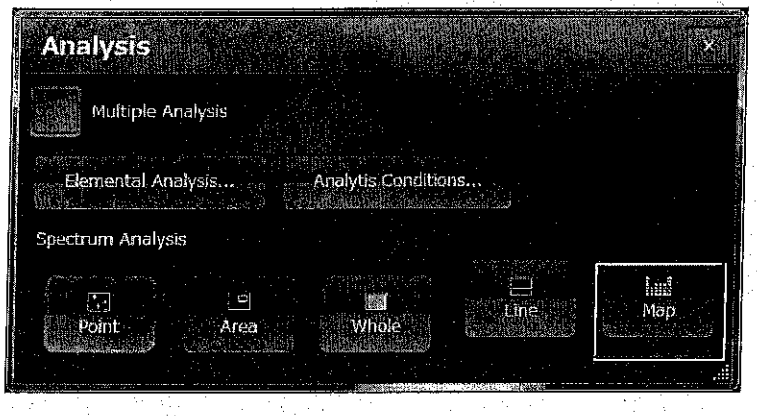
4.8.3 Mapping

All elements mapping of the entire observation image area is executed.

1. Tap the Analysis icon from Home.
   The Analysis window is displayed.



2. Tap the Map icon.
   The image is automatically brought in the analysis station and the analysis starts.

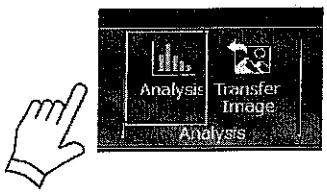


3. Mapping starts and the analysis result is displayed.
   Upon completing the analysis, SEM UI accepts operation. Release the freeze to operate SEM.

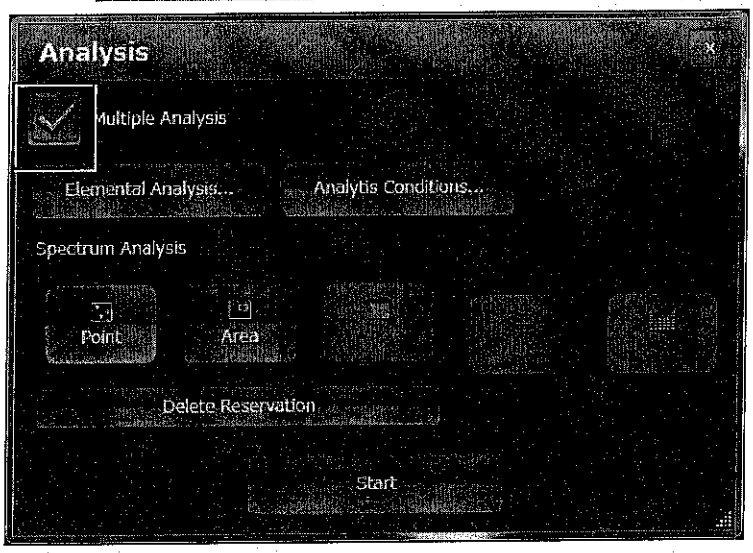
4.8.4 Successive analysis

Spectrum collections at the reserved locations (point or area) subject to analysis are successively executed.

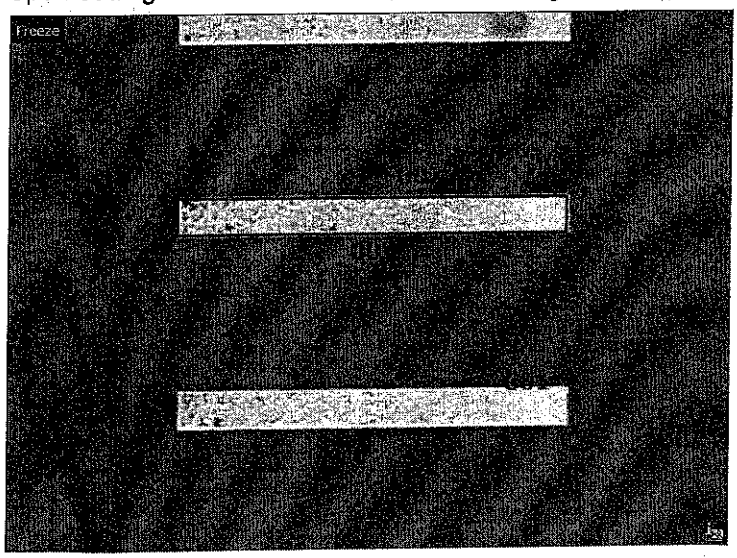
1. Tap the Analysis icon from Home.
   The Analysis window is displayed.



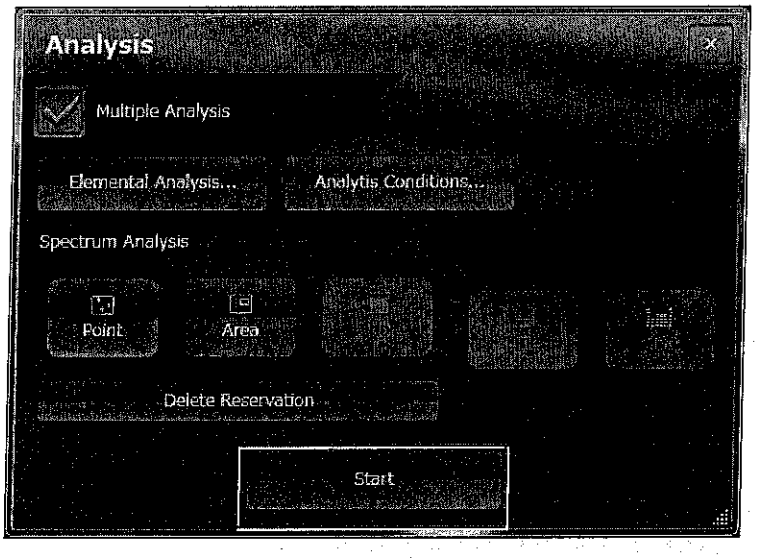
2. Check Multiple Analysis.



3. Reserve locations to be analyzed for point or area analysis.
   The reservation in combination of point and area is possible.
   Upon setting the first reservation, a freeze image is brought in the analysis station.



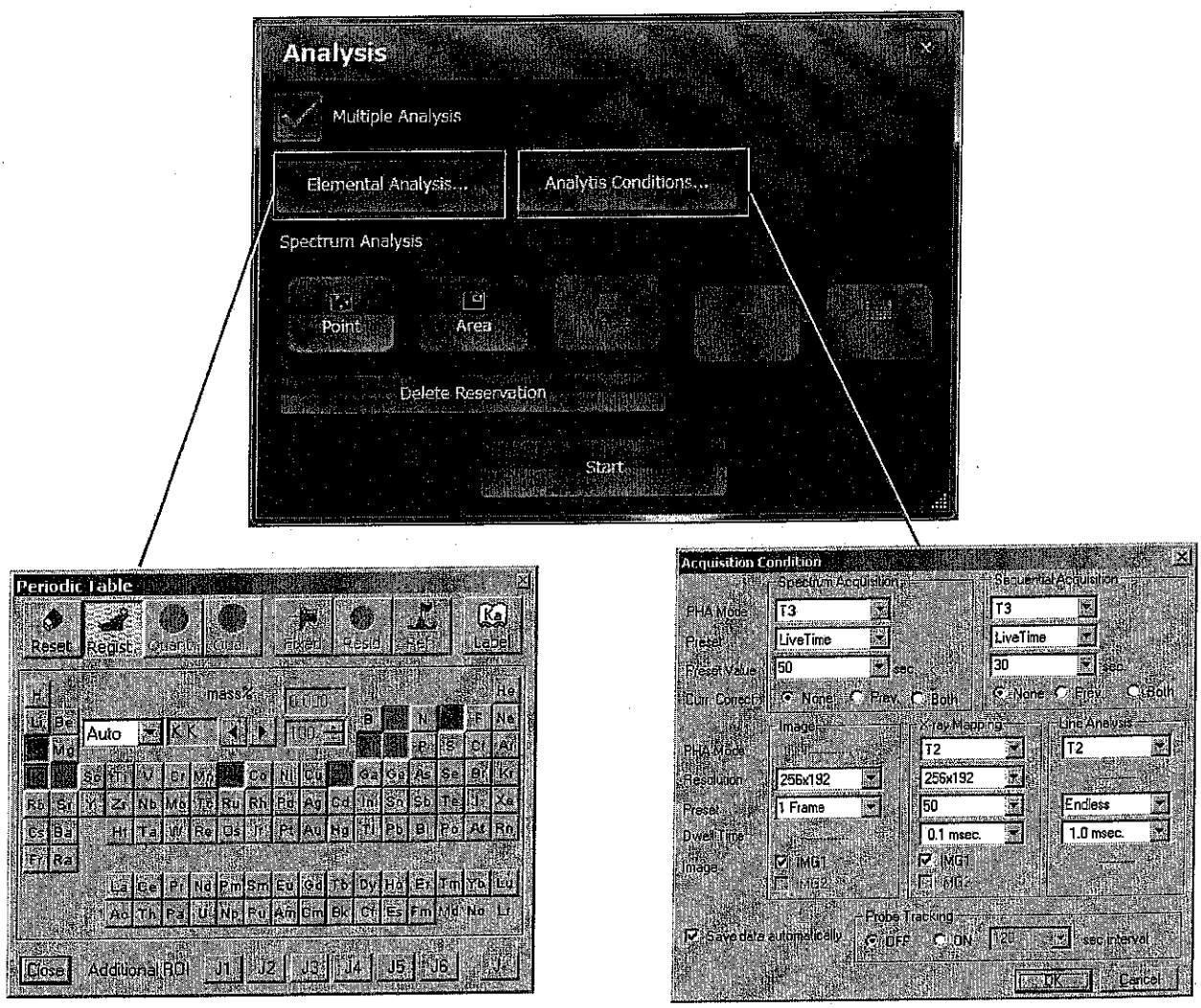
4. Tap the Start button in the analysis window.
Spectrum collection starts in the reserved order.
The marker is displayed in red before spectrum collection, yellow during the collection, and light blue at the complete or halt of the collection.
For deleting the marker after completing the spectrum collection, tap the Delete Reservation button in the analysis window, or change the magnification or the stage location and displace the vision by using the image shift.



4.8.5 Setting analysis conditions

The measurement condition window or the periodic chart window of the analysis station can be called up from SEM UI.
For detailed information of these windows, see the operating manual of the EDS detector.

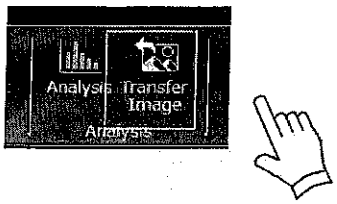
- Tapping the Elemental Analysis button displays the Periodic Table window.
- Tapping the Analysis Conditions button displays the Acquisition Condition window.



4.8.6 Registering an analysis image

Register the image observed by SEM in the analysis station for using the vision when conducting an EDS analysis in the analysis station, for example.
For analyzing methods after the registration, see the operating manual of the EDS detector.

1. Tap the Transfer Image icon from Home

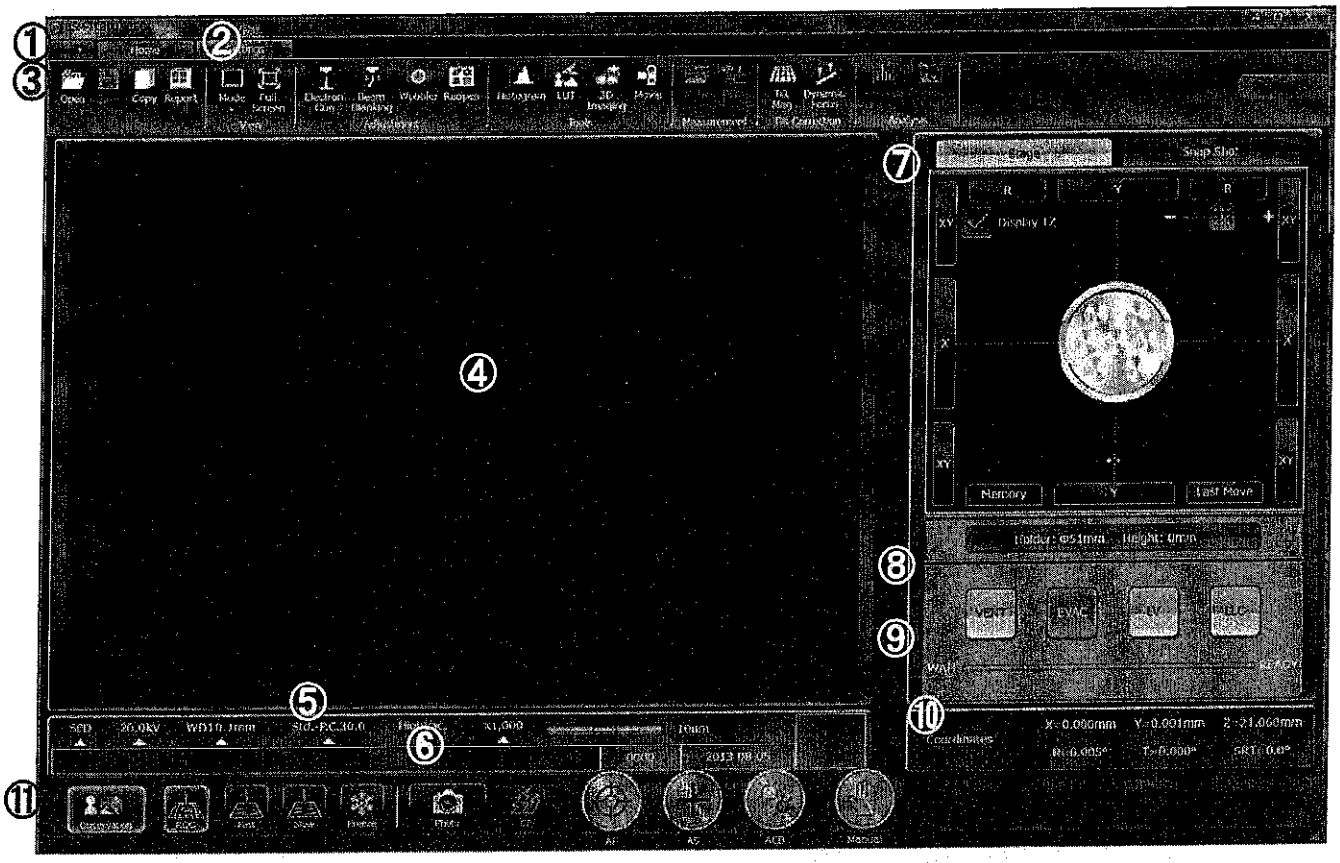


2. The image information during SEM observation is registered in the analysis station.

5

DESCRIPTION OF THE OPERATION SECTION

5.1 MAIN WINDOW

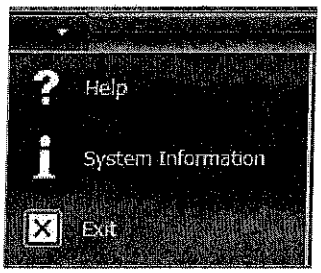


	Name	Description
1	Title bar	Arranged with the JSM-IT300 logo and the [Min./Max./Close] buttons.
2	Menu bar	Pull down (▼) , Home, Settings
3	Icon	The icon array switches when switching Home and Settings.
4	Main screen	Displays the standard, multiple, flexible and signal mixing windows.
5	Photo data	Displays the present signal, acceleration voltage, working distance, probe current, vacuum mode, magnification, etc.
6	Area for Label・No. date and logo	Enables text entry, and setting of No., date and logo.
7	Navigator area	Enables stage movement, snapshot image display and save, chamber scope image display, stage navigation operation, etc.
8	Area for specimen holder selection and specimen height entry	Enables selection of a specimen holder and entry of a specimen height.
9	Evacuation button	Arranged with the VENT、EVAC、LV and LLC buttons and the evacuation progress bar
10	Coordinates display	Displays the present coordinates of the stage.
11	Fixation icons	Arranged with the high-voltage ON/OFF icon, scan icon, auto-start icon, and manual control tools display icon.

5.2 MENU BAR

5.2.1 Pulldown(▼)

Tapping the ▼ mark displays the following pulldown menu:



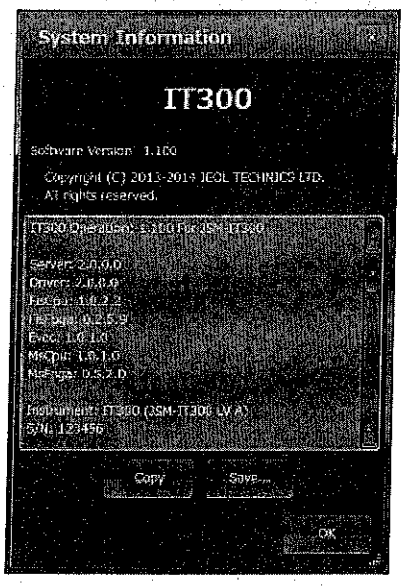
① Help

The help guide opens. The help guide includes the following items:

1. Simple operation	Instrument start, specimen preparation, specimen replacement, condition setting, observation, photographing and save, specimen removal, and instrument termination
2. Microscope adjustment	Filament replacement and filament adjustment

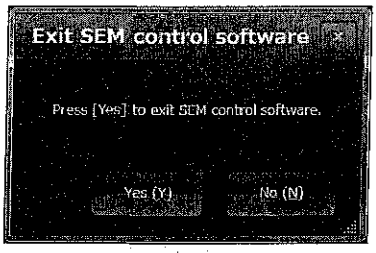
② System Information

Displays the software version and serial number (S/N).



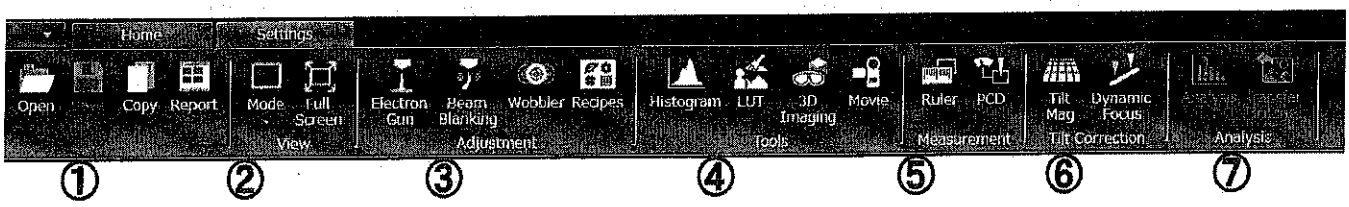
③ Exit

Displays the following window.



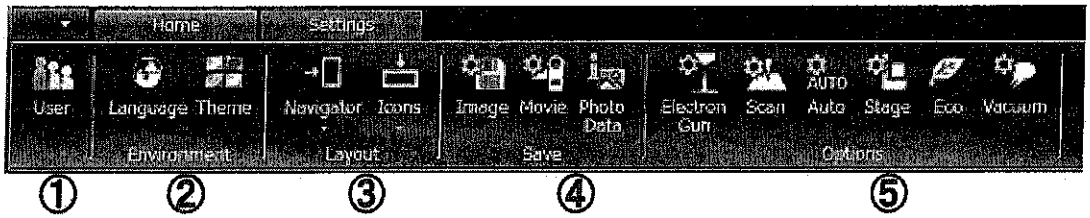
Yes	Terminates the application and closes UI.
No	Does not terminate the application and displays UI.

5.2.2 Home



	Name	Description
1	Image management	Open : Open the image file. Save : Saves an image (In the case of Auto save being turned off). Copy : Registers an image on the clipboard. Report : Starts the report preparation software (Smile View).
2	View	Mode : Enables changing to the standard, multiple, flexible or signal mixing window. Full Screen : Enables an image to be displayed in the whole area of the monitor.
3	Adjustment	Electron Gun : Displays the window for heating the filament or adjusting the electron beam axis. Beam Blanking : Executes beam blanking to mitigate specimen damage. Wobbler : Executes wobbler and adjusts the location of movable aperture. Recipes : Displays the window for setting the most suitable observation conditions based on the specimen category.
4	Tools	Histogram : Displays the brightness and contrast of an image in a histogram. LUT : Displays the window for digital adjustment or pseudo-color display of an image. 3D Imaging : Displays the window for preparing an anaglyph image or 3D measurement image. Movie : Saves a moving image.
5	Measurement	Ruler : Displays the window for measuring a distance between two points, area, etc. PCD : Measures an irradiation current by using the probe current detector (effective when mounting the option).
6	Tilt Correction	Tilt Mag : Displays the window for matching the magnification in the upper and lower portions of the observation vision with a specimen being tilted. Dynamic Focus : Displays the window for correcting the focus such that all surfaces of a specimen are in focus with the specimen being tilted.
7	Analysis (effective with the A／LA model)	Analysis : Displays the window for analyzing elements by using energy dispersive X-ray spectrometer (EDS). Transfer image : Transfers an image of the analysis vision to the analysis station.

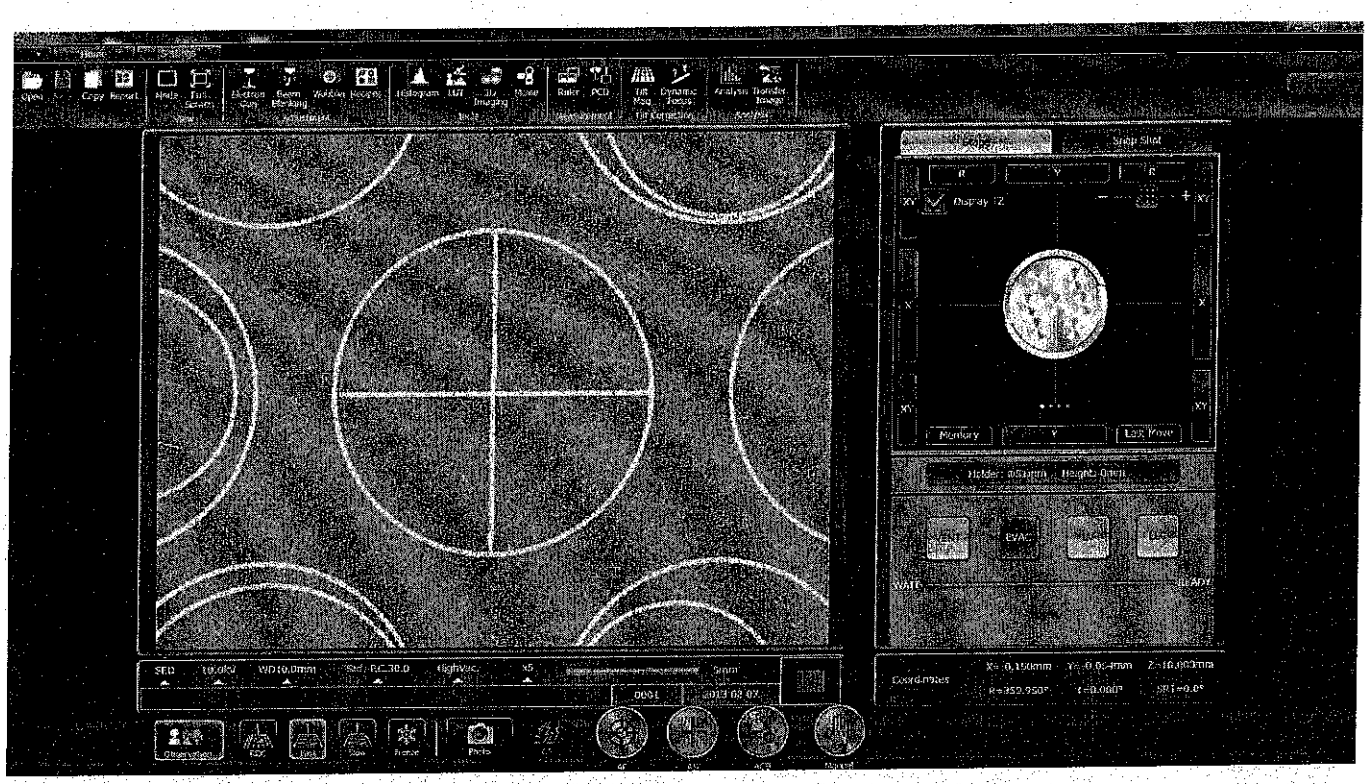
5.2.3 Settings



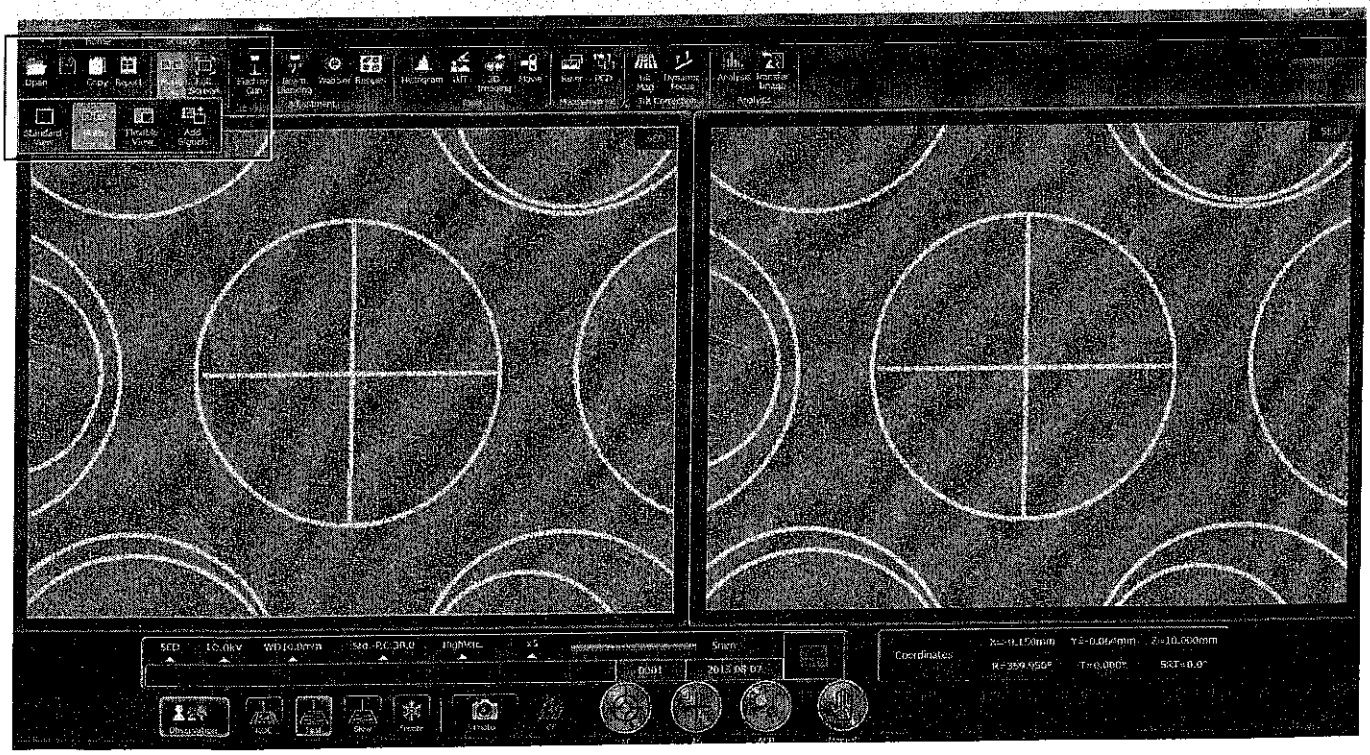
	Name	Description
1	User	Displays the window for logging of or switching the user.
2	Environment	Language : Displays the window for setting the language. Theme : Displays the window for setting window design (color for SEM UI).
3	Layout	Navigator : Enables the arrangement of the navigator area to be changed. Icons : Enables the arrangement of the fixed icons to be changed.
4	Save	Image : Displays the window for setting the image format or auto-save destination when saving an image. Movie : Displays the window for setting the image quality or save destination when saving a movie. Photo Data : Displays the window for setting the image quality or save destination when saving a movie.
5	Options	Electron Gun : Displays the window for heating the filament or adjusting the axis of electron beam. Scan : Displays the window for setting the scan speed and photo mode. AutoDisplays the window for setting the auto-interlock function and adjusting ACB. Stage : Displays the window for setting the stage movement method and movement limit. Eco : Displays the window for setting power saving during standby. Vacuum Displays the window for setting slow leak.

5.3 MAIN SCREEN

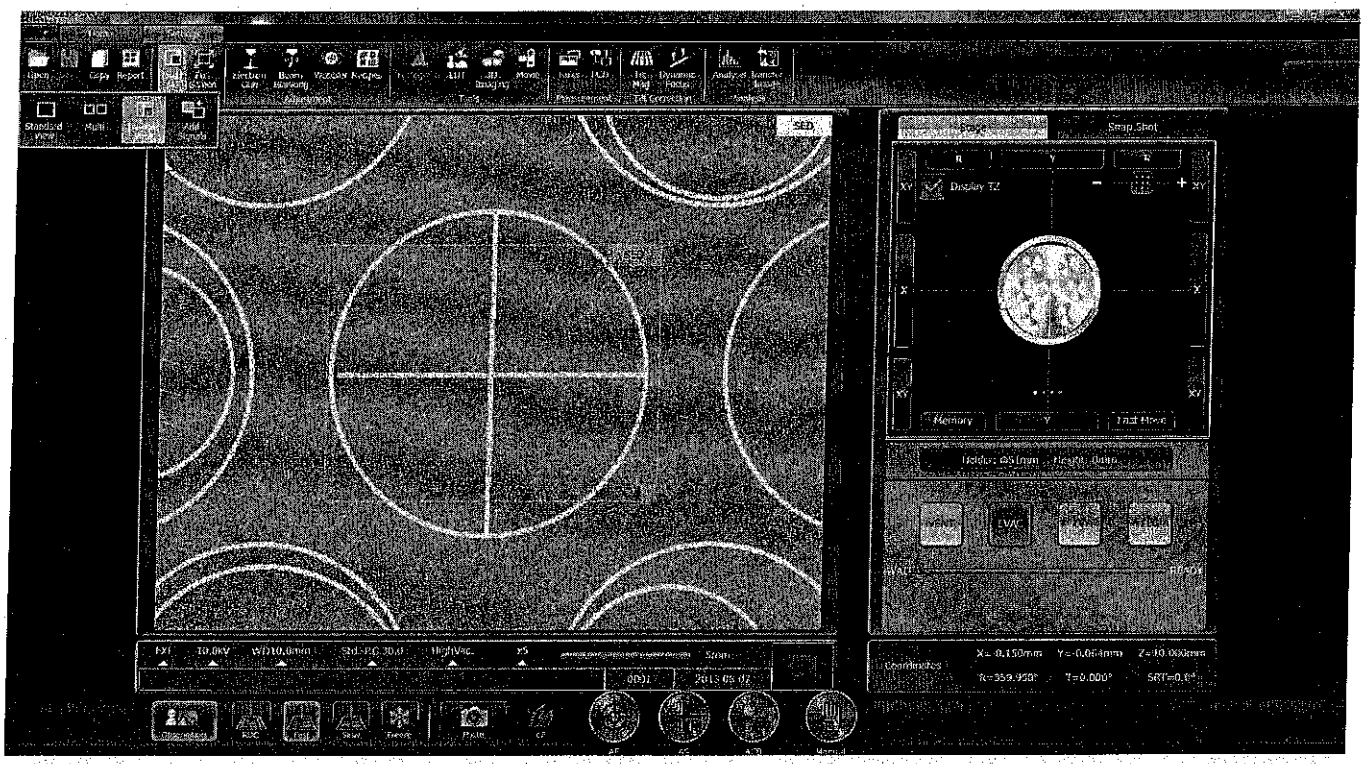
The Mode icon (see the illustration below) enables display of respective windows.



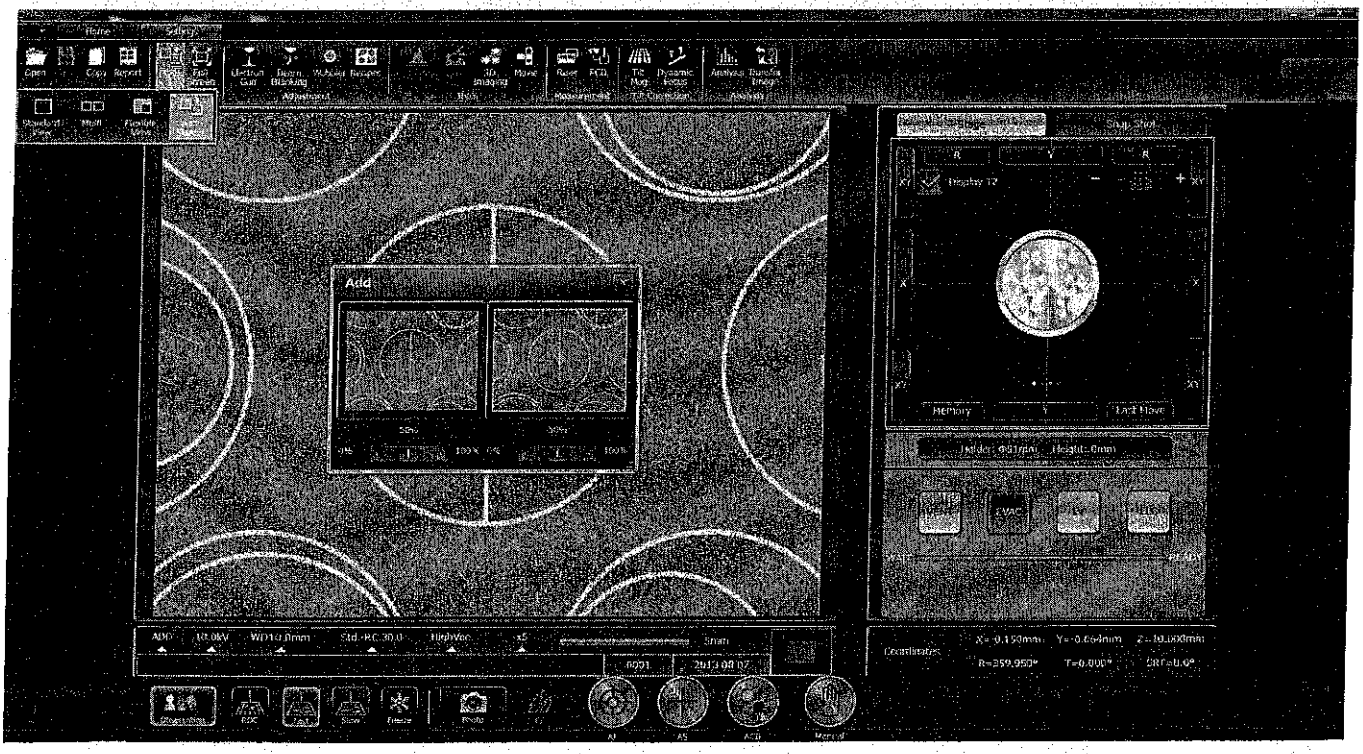
Standard view



Multi



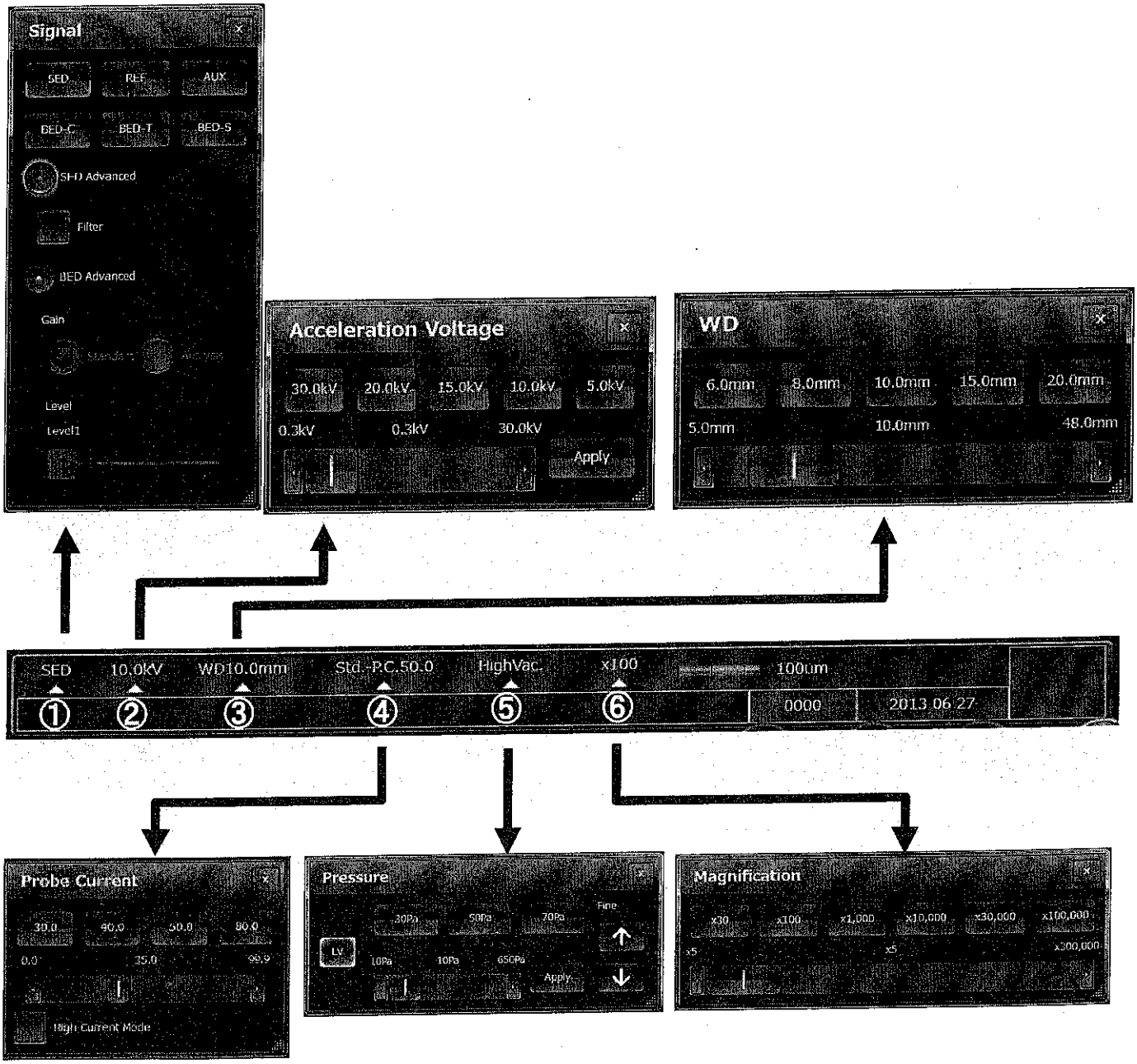
Flexible view



Add signal

5.4 PHOTO DATA

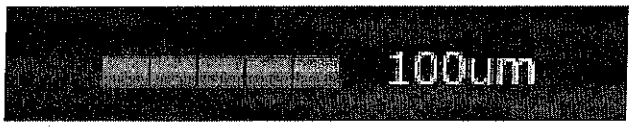
The present observation conditions are displayed.
Tapping the △ marks below the respective photo data displays various windows, thereby enabling change of the observation conditions.



	Name	Description
1	Signal	Enables switching of the signal.
2	Acceleration voltage	Enables switching of the acceleration voltage.
3	WD	Sets a focus current for selected WD.
4	Probe Current	Enables switching of the irradiation current.
5	Pressure	Enables switching of the vacuum mode and setting of a pressure
6	Magnification	Enables switching of the magnification.

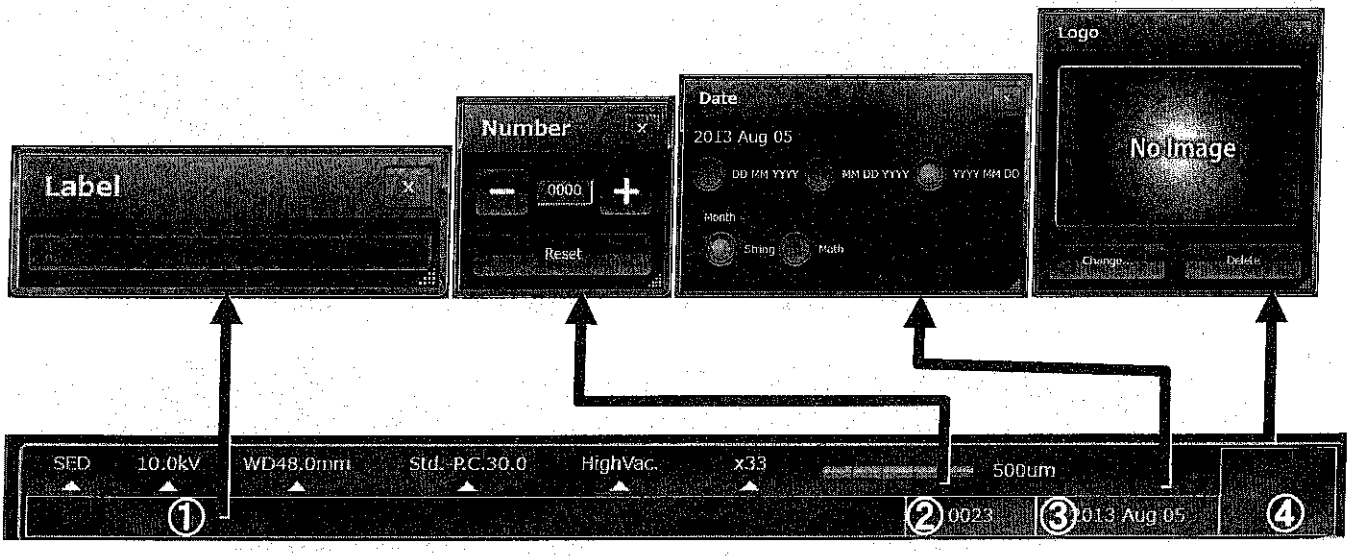
5.5 MICRON BAR, MICRON VALUE

The micron bar and micron value corresponding to the present magnification are displayed.



5.6 LABEL, NUMBER, DATE, ROGO AREA

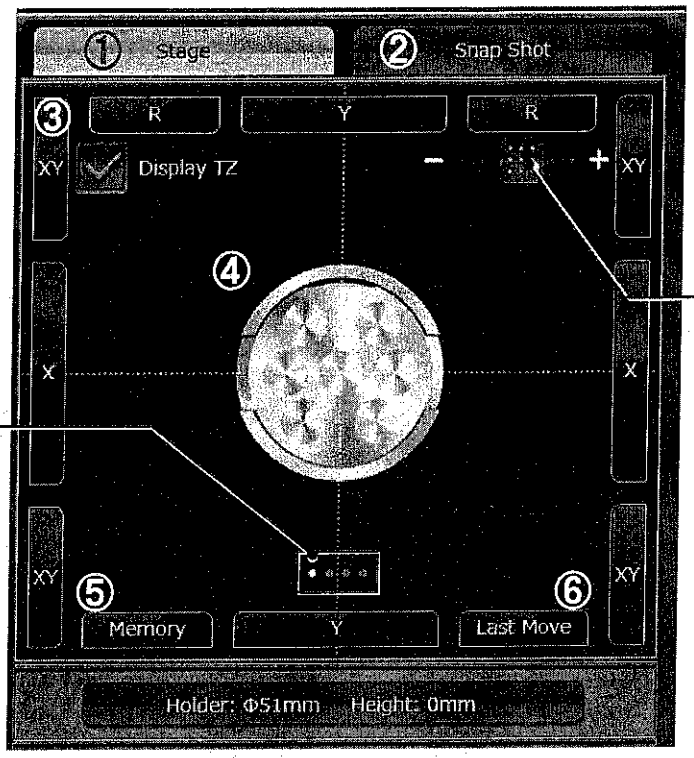
Tapping respective photo data displays various windows, enabling setting.



	Name	Description
1	Label	Enables label inscription.
2	Number	Enables setting of data number
3	Date	Enables setting of date
4	Logo	Enables pasting of logo.

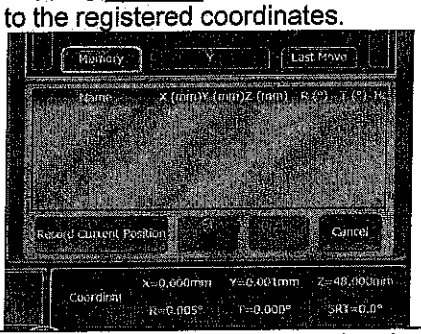
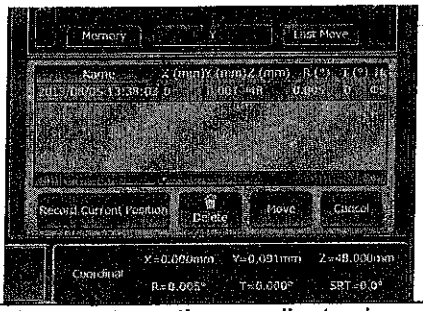
5.7 NAVIGATOR AREA

5.7.1 Stage



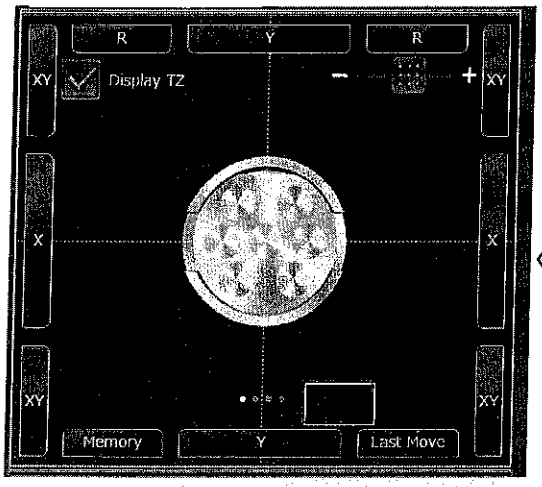
Slide (Graphic display scaling) button

Page advance button

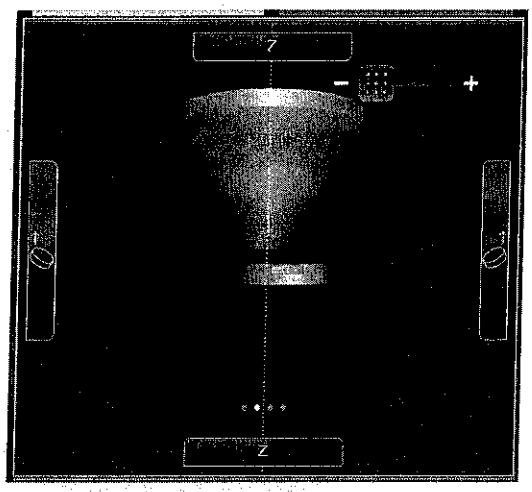
	Name	Description
1	Stage	Enables operation associated with stage movement.
2	Snap Shot	Enables simple saving of live images.
3	Stage movement button	Enables movement of the stage along the X, Y or R-axis, and simultaneously along the X and Y-axes.
4	Specimen holder graphic display	Graphically displays the specimen holder in selection. The slide button on the upper right enables scaling. Checking Display TZ reflects the degree of tilt viewing from top on to the graphic when operating the T and Z-axes.
5	Memory	Tapping Memory button enables registration of the present coordinates and movement to the registered coordinates.  
6	Last Move	Tapping this button after moving the stage restores the coordinates immediately before the movement.

<Switching between stage screens>

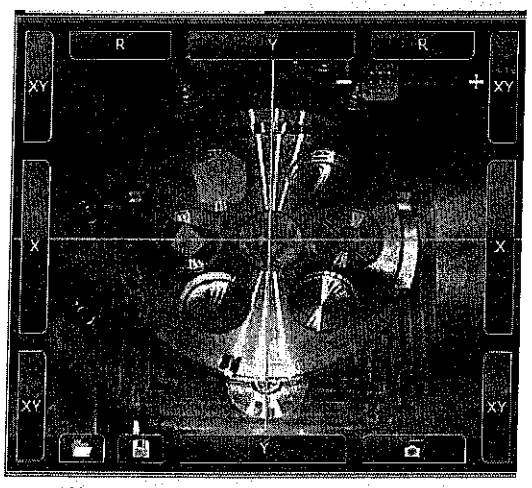
Swipping[1] the area other than the stage movement button within the graphic enables switching of the screens of viewing the specimen holder from top and lateral directions, the stage navigation screen, and the chamber scope screen. Switching the screens is also possible by tapping the page advance button.



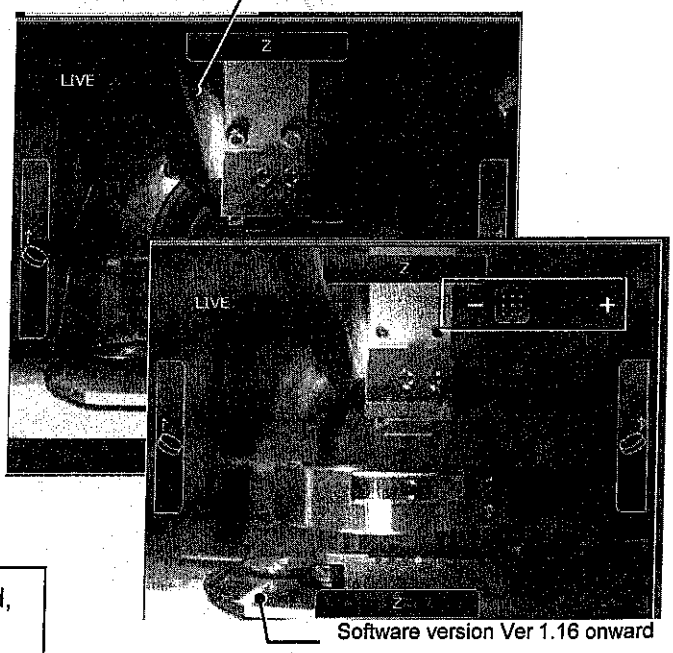
X, Y and R-axes movement screen (basis)



T and Z-axes movement screen



※ Stage navigation screen



※ Chamber scope screen

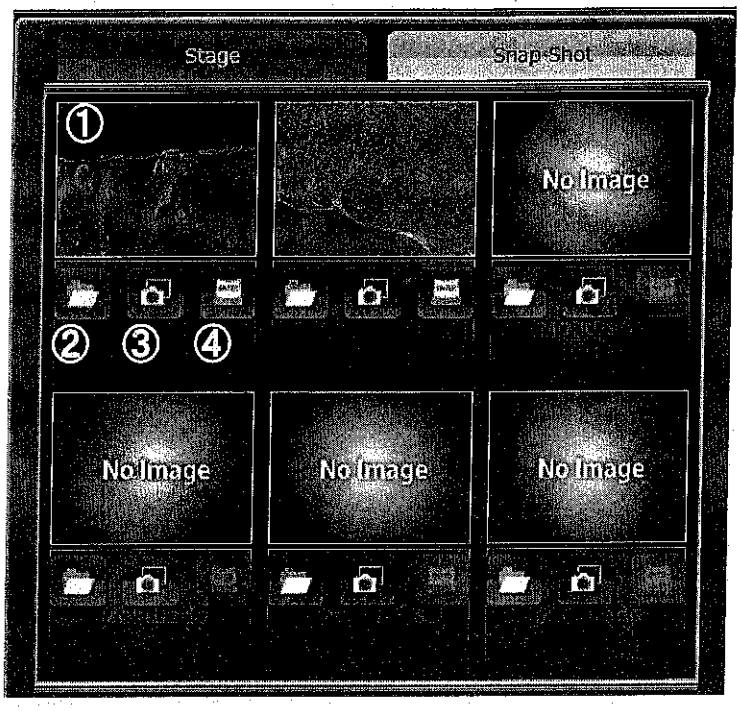
Software version Ver 1.16 onward, scale the chamber scope image.

※ The stage navigation system and the chamber scope (both are optional) are required.

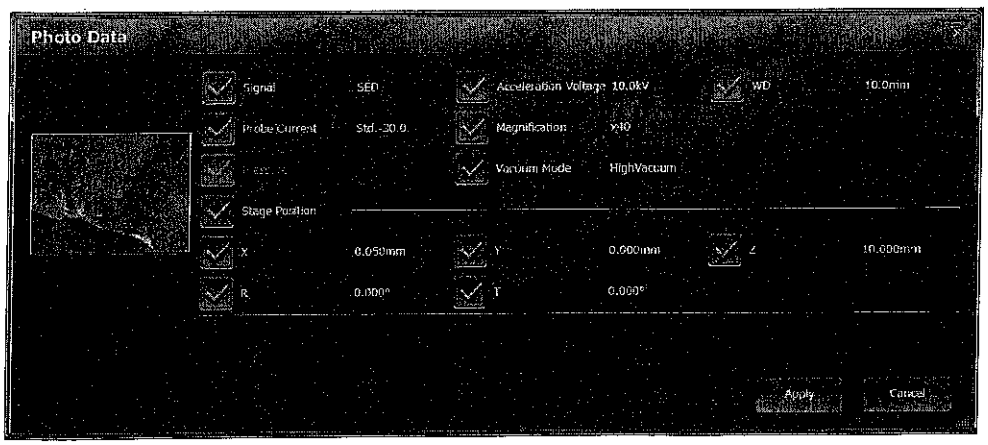
[1] Swipe means to slide the fingertip while pressing the screen.

5.7.2 Snap Shot

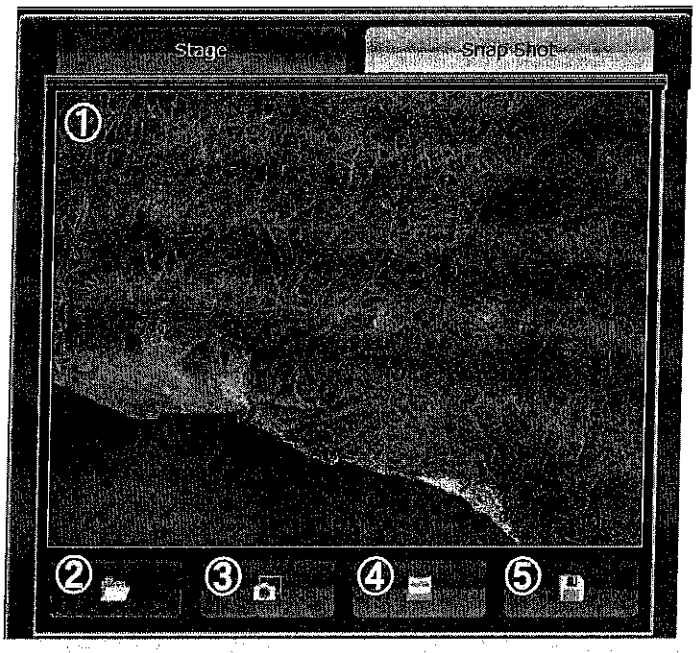
Six screen mode



	Name	Description
1	Image paste area	Tapping the snap icon ③ with the live or freeze image being displayed enables pasting of the image in this area.
2	Icon for opening a file	Tapping this icon enables calling-up of an image stored in the predetermined folder and pasting thereof in the image paste area ①.
3	Snap icon	Icon for pasting an image in the area ①.
4	Condition reproduction icon	For reproducing the conditions when an image was pasted, tap this icon to display the photo data window, check the conditions desired to reproduce in said window, and then tap the Apply button.



Single screen mode



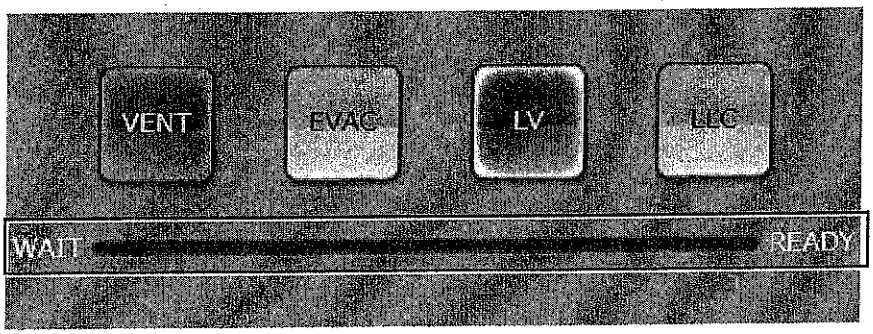
	Name	Description
1	Navigation image	If you enclose the area which want to enlarge by the frame in this image, the stage moves so that the center of area becomes center of the main screen. The magnification is enlarged depending on the frame size.
2	Icon for opening a file	Tapping this icon enables calling-up of an image stored in the predetermined folder and pasting thereof in the image paste area ①.
3	Snap icon	Icon for pasting an image in the area ①.
4	Condition reproduction icon	For reproducing the conditions when an image was pasted, tap this icon to display the photo data window, check the conditions desired to reproduce in said window, and then tap the Apply button.
5	Icon for saving a image	Tapping this icon enables storing a snap image into the arbitrary location. An area frame is also stored at the same time.

5.8 AREA FOR SPECIMEN HOLDER AND SPECIMEN HEIGHT

Enables selection of the specimen holder and entry of a specimen height.

5.9 EVACUATION BUTTON AND EVACUATION PROGRESS BAR

Enables switching of the evacuation and vacuum modes of the specimen chamber and verification of evacuation progress.



VENT	Sets the specimen chamber and EOS to VENT (state at the atmospheric pressure).
EVAC	Evacuate the specimen chamber and EOS.
LV	Enables switching of the vacuum mode.
LLC [2]	Evacuates the load lock chamber.

Table 1 Evacuation progress bar

Evacuation process	Progress			
WAIT (state at the atmospheric pressure)				
PRE EVAC (start of rough pumping)				
PRE EVAC ⇒ EVAC (start of main pumping)				
EVAC (during main pumping)				
READY (state of image observation enabled)				

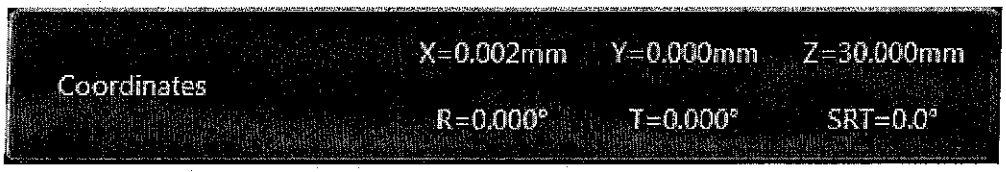
[2] Effective when the Load Lock Chamber (option) is equipped.

5.10 COORDINATES DISPLAY

The present coordinates are displayed, and tapping one of the items enables operation of the stage by specifying the coordinates

（＊ excluding SRT display）

Tapping the SRT displays the manual adjustment tool as shown on the next pate, thereby enabling rotation of the image.

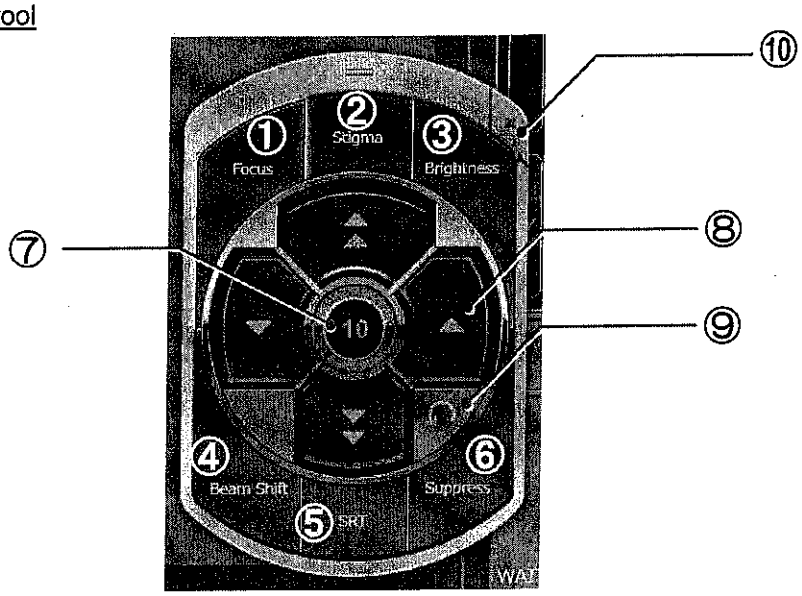


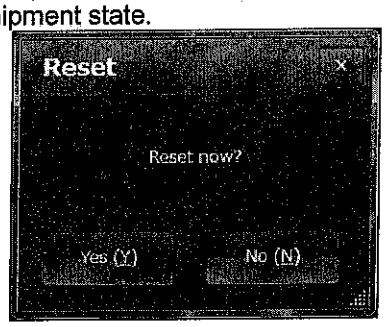
5.11 FIXED ICON

	Name	Description
1	Observation icon	Used when observing an image.
2	RDC icon	Limits the electron beam scan range. ＊Screen resolution (320×240 pixels)
3	Fast icon	Displays a live image at high speed.
4	Slow icon	Displays a live image at slow speed.
5	Freeze icon	Makes a live image to a static image.
6	Photo icon	Starts imaging.
7	CF icon	Mitigates charge-up[3] of the specimen.
8	AF icon	Automatically adjusts the focus of an image.
9	AS icon	Automatically corrects the astigmatism of an image.
10	ACB icon	Automatically adjusts the brightness of an image.
11	Manual icon	Used for manually adjusting the observation conditions. Tapping this icon displays the manual adjustment tool shown on the next page.

[3] A phenomena in which the observed images have uneven brightness or shifting of the field of view during the scan due to electric charges building up on the specimen.

Manual adjustment tool



	Name	Description
1	Focus	Used for focus adjustment of an image.
2	Stigma	Used for astigmatism correction of an image
3	Brightness	Used for brightness adjustment of an image.
4	Beam Shift	Used for movement the field of view at high magnification
5	SRT	Used for image rotation.
6	Suppress	Used for rough adjustment of the brightness of a backscattered electron image.
7	Center display	In the Focus①, the working distance is displayed. The indicator is displayed in the Stigma②, Brightness③, and Beam Shift④. The angle is displayed in SRT⑤.
8	Adjustment button	The button display switches according to the selection of respective adjustment items, and the selected item can be adjusted.
9	Reset button	Displayed when selecting the Focus①, Stigma②, and Beam Shift④. Tapping the button displays the reset message, and tapping Yes button resets the equipment to the shipment state. 
10	Close button	Close the manual adjustment tool.

PREPARATION OF REPORT

6.1 GENERAL

＜Report creation software (SMile View)＞
SMile View is software for displaying the index image of scanning electron microscope (SEM) image data on the personal computer for easy layout and printing.
The SEM image data consist of SEM image files in BMP format and text files that contain observation conditions. This software links these observation conditions to image files, enabling you to display an index image that contains SEM images with observation-condition data on a folder-by-folder basis.

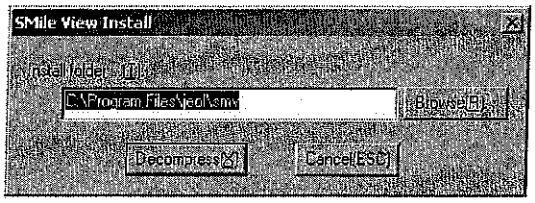
You can edit the displayed SEM image on the layout sheet, and print it at the same size as a photograph. Also, new features enable directory display and data transfer to Microsoft Word files.
(Since the PC and Microsoft Word are not included in this software, please prepare these separately)

＜Applicable image formats＞
Bitmap (BMP) format, JPEG format, uncompressed TIFF format, extended metafile format

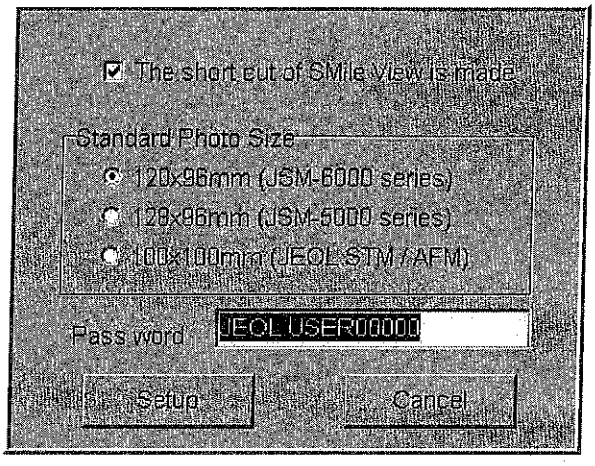
＜Functions＞
Index-image display, magnified image display, label, memo, index print, layout sheet, layout batch print, layout-sheet saving, ACB (automatic contrast/brightness adjustment), image-capturing tool, easy distance measurement (vertical distance, horizontal distance, distance between two arbitrary points, average profile display), two kinds of image filtering, transfer to Word, directory display, search

6.2 INSTALLATION PROCEDURE

1. Insert the floppy disk into the personal computer, and then double-tap to start Install.exe.
   The below window is displayed appears.



2. Specify an installation folder, and tap the Decompress button.
   The default is C:\Program Files\jeol\smv.
   When the installation (decompression) is completed, the setup window is displayed.
3. Put a check next to The short cut of SMile View is made.
4. In "**Standard Photo Size**", select 128×96mm .
5. Enter the password.
   As the password, type JEOL USER00000 in uppercase letters.



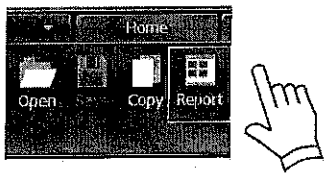
6. Tap the Setup button.
   After the message, "Setup completed" appears, tap on OK button.
   The above procedure completes the installation. Start SMile View from the desktop shortcut.

6.3 BASIC OPERATIONS

This chapter introduces basic procedures for operating SMile View.

6.3.1 Start the Smile View

1. Tap the Report icon from Home.
   The report creation software SMile View starts.

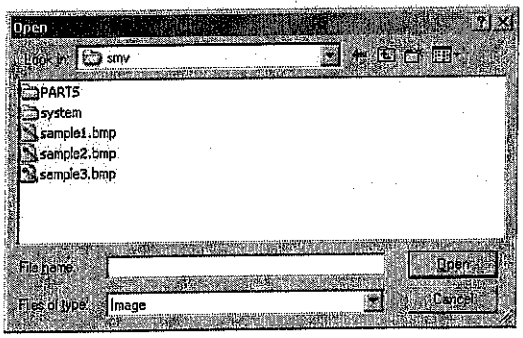


6.3.2 Displaying Index Image

With SMile View, you can open the index-image screen by using one of the two methods to show the SEM image.

6.3.3 Opening by using File menu

1. After starting SMile View, select the **Open** command from the **File** menu.
   This displays the Open window.
2. Select the folder in which SEM images are stored from the **Look in** box in the Open window.
3. Select the file name of the SEM image that you want to see from the image-file index displayed under the Look in box, and click the Open button.
   All of the images contained in the folder are displayed.



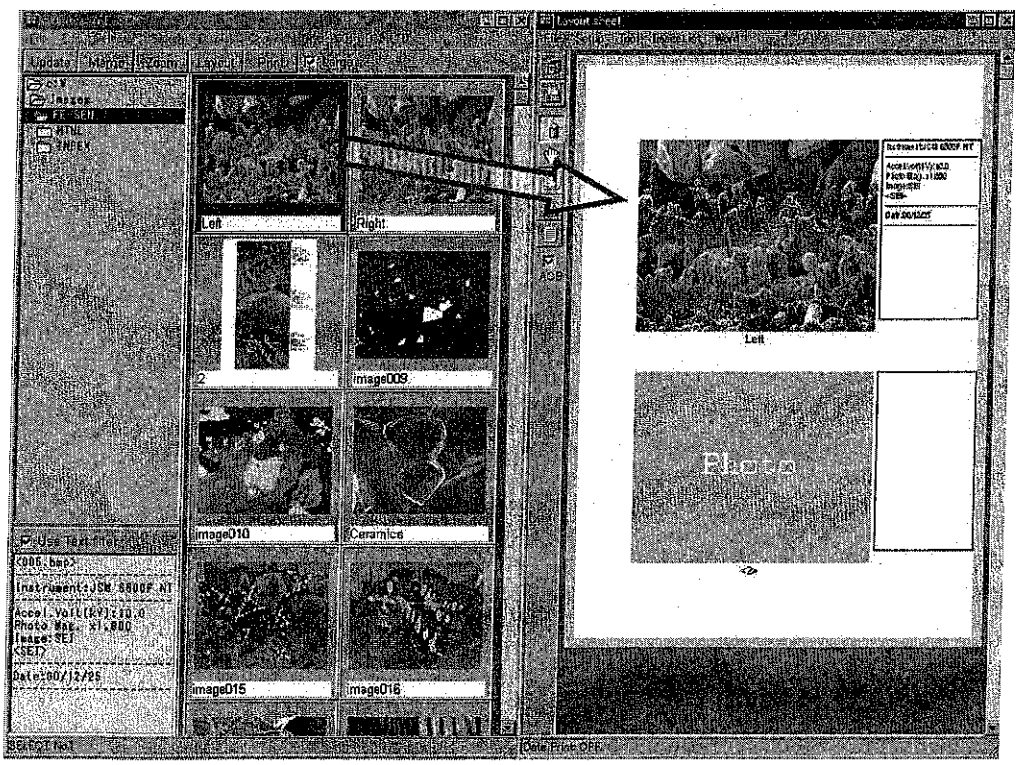
6.3.4 Opening by drag and drop

1. Drag a folder in which SEM images are stored, a SEM image file, or a text file attached to the SEM images.
2. Drop it into the SMile View shortcut icon, or into the window of the index-image screen after opening SMile View.
   All of the images contained in the folder are displayed.

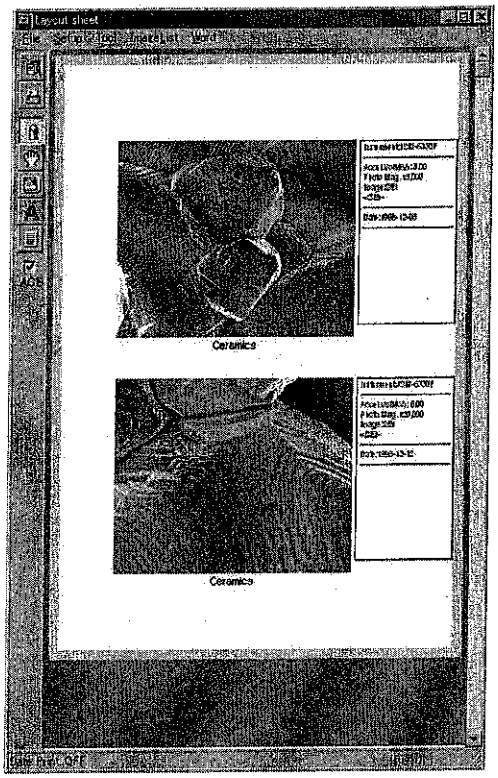
6.3.5 Pasting SEM Image on Layout Sheet

Drag and drop a scaled-down SEM image in the index-image screen into the layout sheet. This pastes the scaled-down SEM image of the same size as the photograph on the layout sheet.

- Drag and drop a scaled-down SEM image in the index-image screen into the layout sheet.
  At the same time, the observation conditions and label attached to the SEM image are pasted to it.
- When you change to another SEM image, the observation conditions and label are changed to those attached to new SEM image, since observation conditions and labels are linked with the SEM image.



- When you have set up the layout of such things as the image area and the text area by using the **Setup** menu, you can paste an image on the same area at any time.
- The layout of such things as the image area and the text area set up by using **Setup** can be freely changed in its position and size by using the Move button.



Ex.) Setup of Layout (two images)

6.3.6 Opening Layout Sheet

The layout sheet saved on the hard disk can be opened by using one of the following three methods.

- Click **Open** in the **File** menu to open the Open window. Specify the folder name and file name that you want to open, and then click the **Open** button.
- Drag and drop the file with extension .Lay directly into the layout sheet.
- Drag and drop the file with extension .Lay directly into the SMile View icon. This creates a new layout sheet.

6.3.7 Saving Layout Sheet

When finished with the layout of items such as SEM images, observation conditions and text on a layout sheet, you can save the layout sheet on the hard disk.

Layout sheets are saved by default in the same folder in which the SEM image displayed on the index-image screen is saved.

1. Tap **Save as** in the **File** menu.
2. Type the file name that you want, and then click the Save button.
   Layout sheets are saved with the extension .lay.

6.3.8 Printing Layout Sheet

You can carry out batch printing of the displayed layout sheet and of other layout sheets saved in the same folder as the displayed layout sheet.

6.3.8.a Printing of displayed layout sheet

Here is the procedure for printing the displayed layout sheet.

1. Select **Print** from the **File** menu, or tap the Print button on the toolbar. 
   The print window is displayed.
2. Tap the Print button.

6.3.8.b Batch printing of layout sheets

1. Tap **Batch layout print** from the **File** menu.
   The Batch layout print window is displayed.
2. You can carry out batch printing of the layout sheets saved in the specified folder.
   For details on how to perform batch printing, refer to "Batch layout print" in Section 6.6.1.a.

6.4 ADVANCED OPERATIONS

This chapter introduces advanced procedures for operating SMile View.

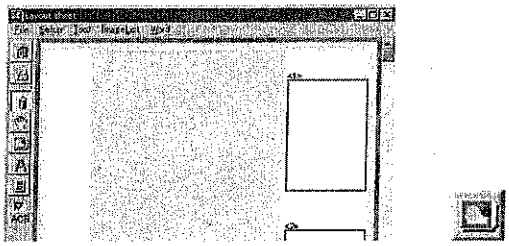
6.4.1 User's Layout

With user's layout, such areas as image and text areas can be freely set and the company's logo or other graphics can be added.

1. Decide on the image area, text and other areas that you want to set.
2. Click **Save User's layout** from the **File** menu.
3. Key in a layout name, and tap the Save button.
   User's layouts are saved by default in the same folder in which the SMile View program is saved (C:\ Program Files\jeol\smv). User's layouts are also saved with the extension .Lay.

6.4.1.a Make the layout seat where two or more photographs can be displayed

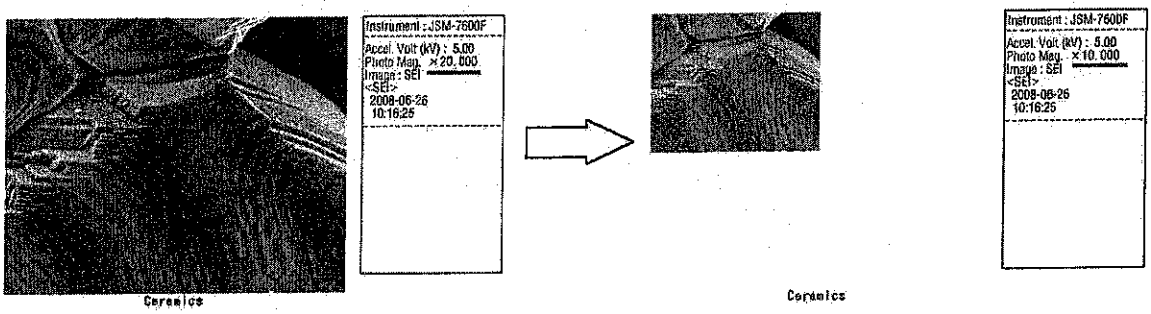
1. Make the image frame.
   The mouse pointer is changed when you tap the SEM image frame button. And then click the image frame you want to display.



2. Adjust the image frame size

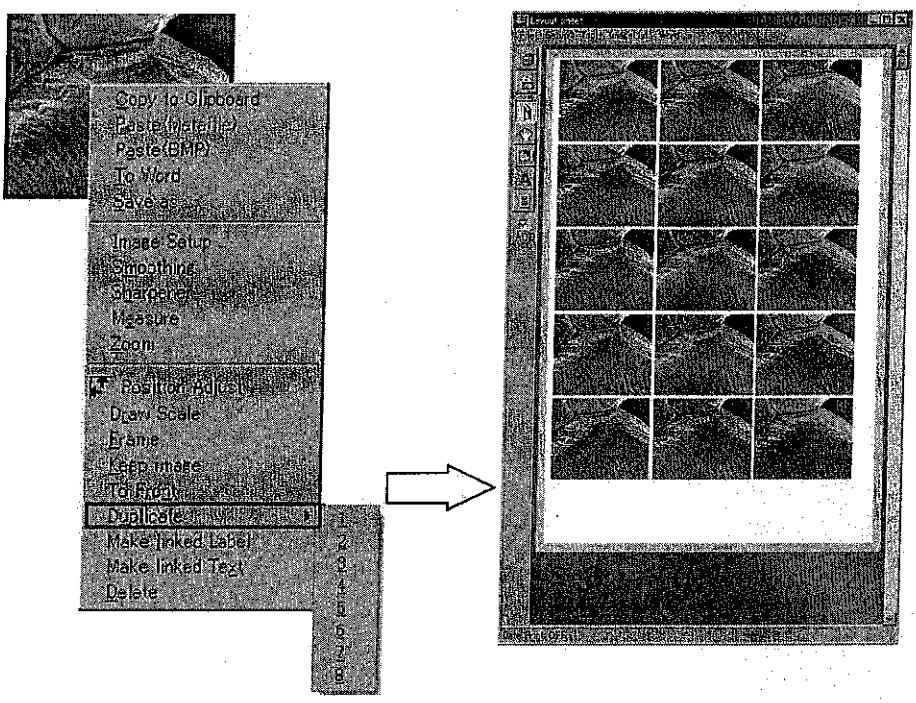
Select the image frame that changes the size by tapping  button. And three square marks appears at the right side, the under side, and the lower right of the image frame. With dragging the mark of the lower right, the frame size, with the aspect ratio maintained, can be changed.

You can adjust it accurately by using the photograph magnification as a standard when the size is decided.
Drag the SEM image to the image frame and drop to it. Then, the photograph magnification is displayed with the image. The photograph size can be decided accurately by adjusting the size while gazing the photograph magnification. This image remains until time when the layout is preserved, however, opening as a user layout, only the image frame is displayed.



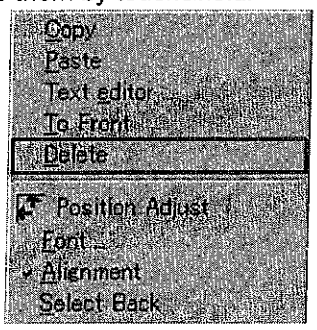
The size of the image changes to 1/4 (The magnification becomes 1/2)

3. Duplicate the image frame.
Touch&hold in the image frame and select **Duplicate**. Make the duplicate of arbitrary number.



Duplicate

When the duplicate is made, the label and the text frame are also copied. If the label and the text frame are unnecessary, you can delete them by touch&hold.



4. Save the layout.
Save the layout according to above method.

6.4.1.b Creating a layout sheet with a company's logo

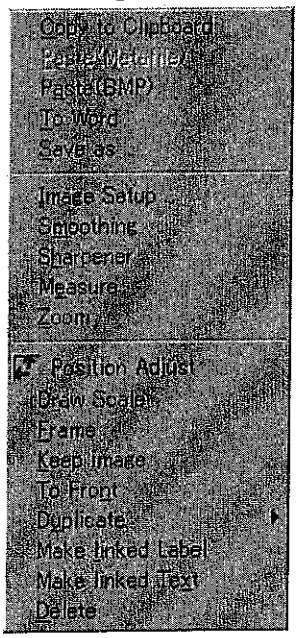
1. Capture the logo in the BMP format by using a scanner, for example.
2. After deciding on the layout of such things as the image area, paste the logo mark on the layout sheet, and then adjust the size and position of the logo mark.
3. Touch&hold the logo mark, and check **Keep image** from the touch&hold menu that appears.
4. Save the layout sheet with the company's logo as a user's layout.

6.4.2 Operations in Layout Sheet

In the layout sheet, placing the mouse pointer over objects, such as an image and text area, and press&tap or touch&hold (clicking the right mouse button) displays various menus. These menus show functions that you can use for the selected object such as an image or text.

6.4.2.a Functions available by right-clicking image area

Perform the Press&tap (Touch&hold) in the image area, the menu shown below is displayed.



Copy to Clipboard
Copies the image to the clipboard.

Paste (Metafile)
Pastes the metafile image from the clipboard to the layout sheet.

Paste (BMP)
Pastes the bitmap image from the clipboard to the layout sheet.

To Word
Adds the selected image and its text data to a Word file.

Save as
Saves the image. You can select bitmap or JPEG as the file format.

Image Setup

Selecting **Image Setup** opens the image setup panel (Fig-30). With the image setup panel, you can set the size of the image frame, and adjust the contrast and brightness of the image.

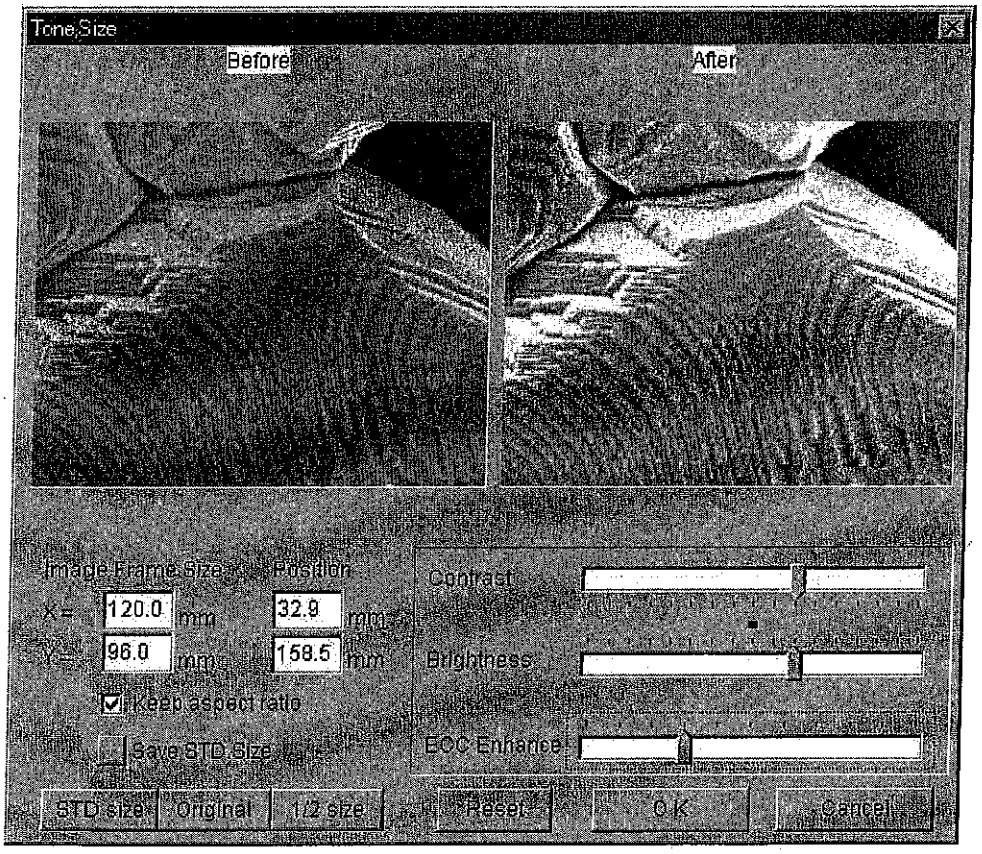
You can change the image frame size by pressing the **STD size**, **Original**, or **1/2 size** button.

Alternatively, you can set it to any size by entering numbers.

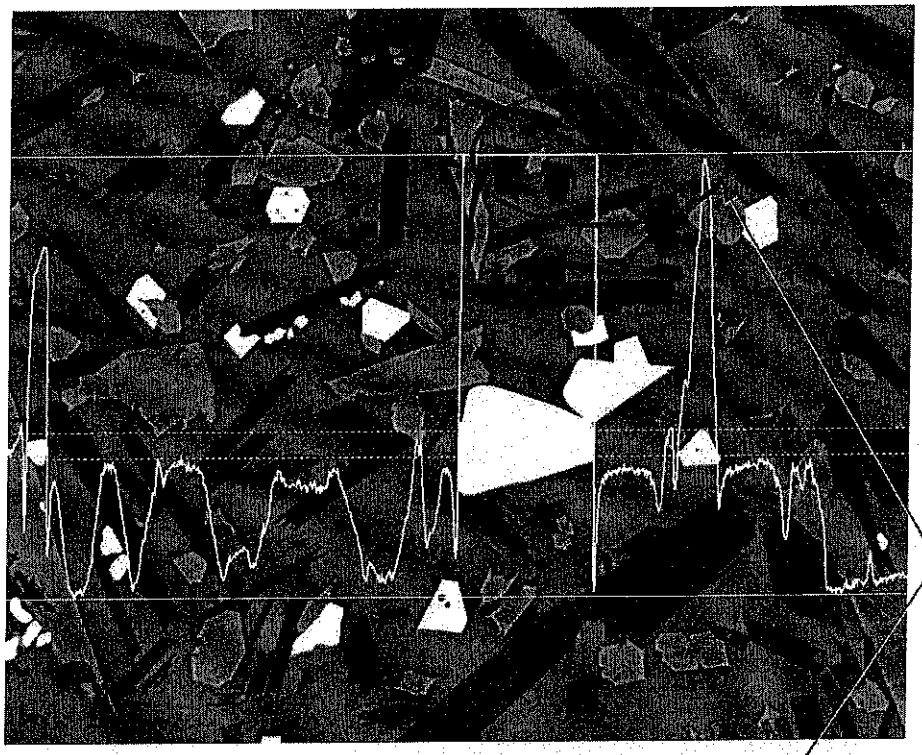
Also, by putting a checkmark to **Keep aspect ratio**, you can keep the image aspect ratio constant even if you change the image frame size. Canceling **Keep aspect ratio** fits the image shape to the image size frame, irrespective of the aspect ratio. After changing the image frame size, clicking **Save STD Size** changes the image frame size to be used for pasting images onto the layout sheet.

If the standard size and the original size[*1] are different, the photographs are enlarged or reduced according to the frame; you cannot print them in the original photography size.

You can change the contrast and brightness of the image by dragging their sliders. ECC enhancement enables you to increase the contrast of an image that contains extremely bright (or dark) regions, without saturating the brightness. You can compare the before and after images in the image setup panel.

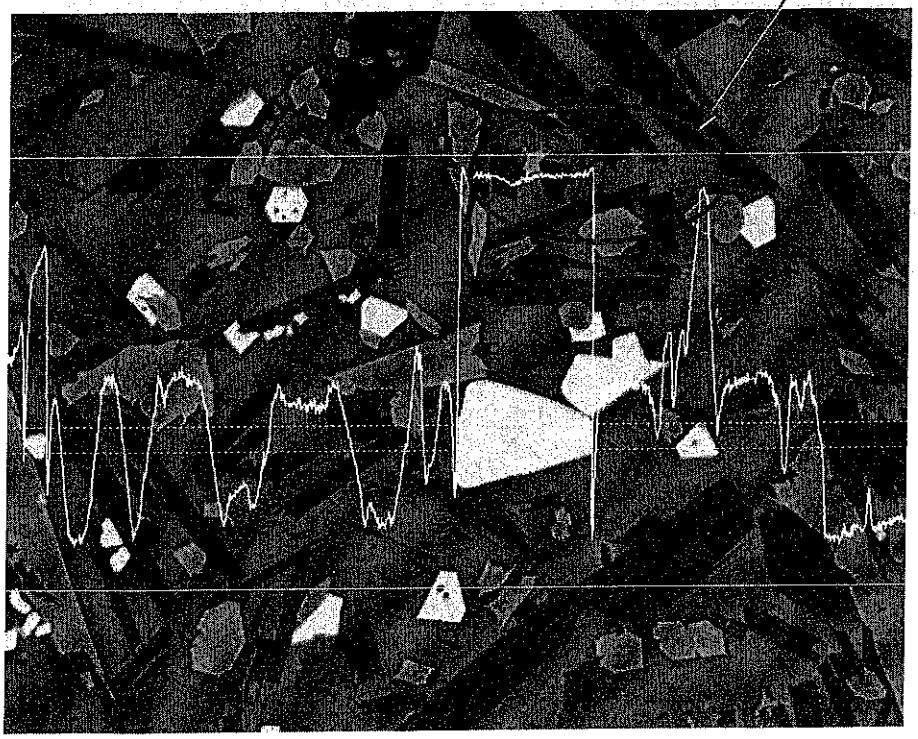


[*1] The standard size is the frame size to be displayed in the layout sheet. On the other hand, the original size is the size of the photographs stored in the bitmap images; it might vary depending on the model or mode.



With only contrast and brightness adjustment

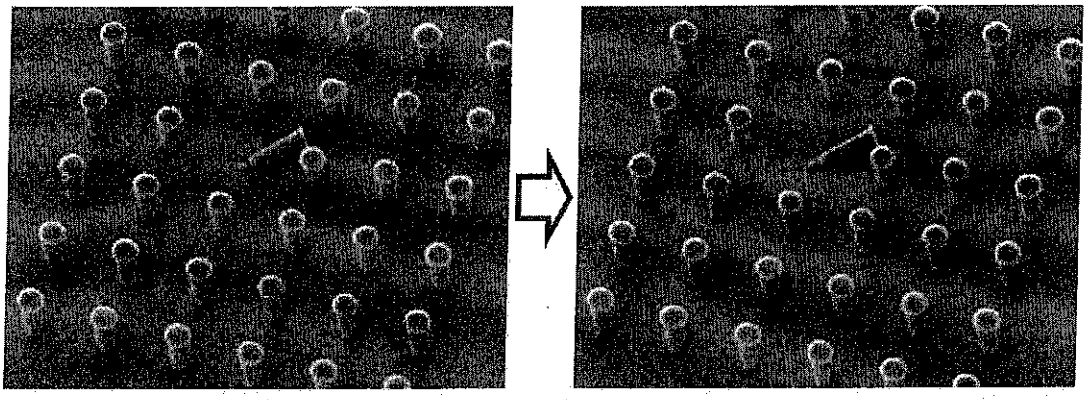
You can increase the contrast without saturating the brightness.



With ECC enhancement

Smoothing

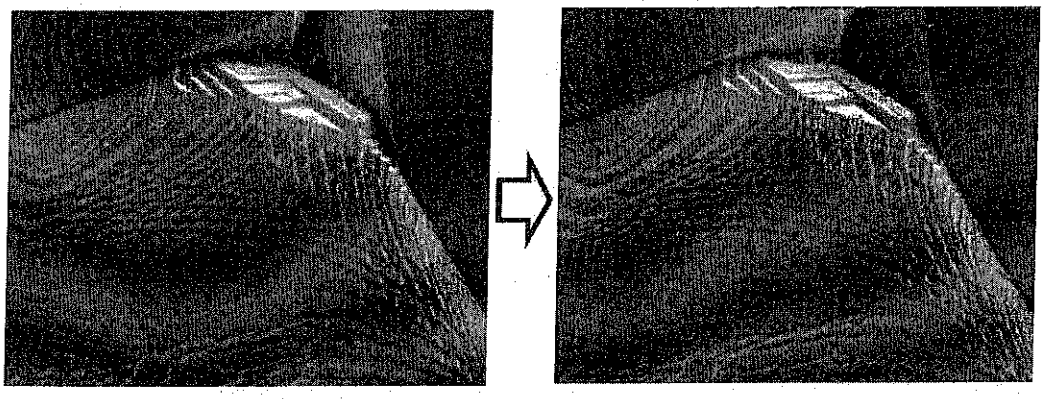
Filtering set with **Auto function Setup** of the **Tool** menu is carried out by using **Smoothing**. An image with noise can be smoothed for observation. (Smoothing applies only to gray-scale images. It does not apply to a copied image that is a colored image.)



Smoothing

Sharpener

A sharper image can be obtained by emphasizing the amount of change in the image using **Sharpener**. (Sharpener applies only to gray-scale images. It does not apply to a copied image that is a colored image.)



Sharpener

Measure

You can measure the distance between two points on the SEM image of a layout sheet. For details, see Section 6.3, "Measurement Function." Measure applies only to SEM images with text information.

Zoom

Enlarges the image.

Position Adjust

Adjusts the position of the image frame, balancing it with image and text frames to its left and above it. This does not work if other frames are some distance away.

Draw Scale

Draws a scale at the lower right of the image. A scale is automatically indicated according to the photograph magnification.

Frame

Surrounds an image with a frame, when **Frame** is selected.

Keep image

When this command is selected, the user's layout is saved together with its image data and layout. To save the logo after layout, keep this command selected.

To Front

Shows a desired image frame on the top of the display, when more than one frame is opened. However, the text frame appears always on the top of the display.

Duplicate

Makes a duplicate of a desired image in the layout sheet. The duplicate is displayed at the same size as the original. You can make up to eight duplicates at a time.

Make linked Label

Makes a label linked with an image frame. However, when a label linked with the image frame already exists, the warning message "Linked label already exists" appears, and you cannot create a new label.

Make linked Text

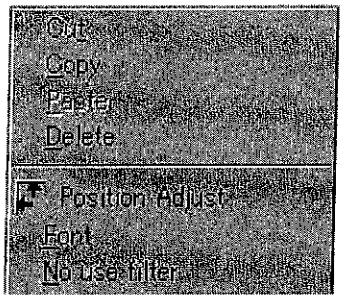
Makes a text frame linked with an image frame. However, when a text linked with the image frame already exists, the warning message "Linked text already exists" appears, and you cannot create a new text area.

Delete

Deletes an image from the image area. However, the label and text that are linked with the image cannot be deleted.

6.4.2.b Functions available by right-clicking text area

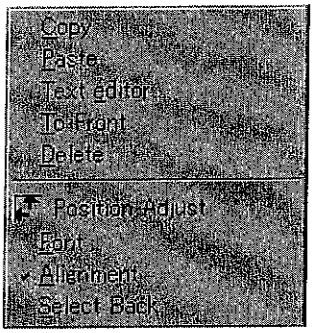
When you press&tap (touch&hold) the text area, a menu appears as shown in Fig-34. The explanations of the functions are given below.



Name	Description
Cut	To cut text, select the text region by dragging the mouse over it while holding down the left mouse button; then, click **Cut**.
Copy	Copies the selected text region, and then saves it on the clipboard.
Paste	Pastes the text saved on the clipboard in the text area.
Delete	Deletes the text area.
Position Adjust	Adjusts the position of the text frame, balancing it with image and text frames to its left and above it.
Font	Specifies parameters such as the type and size of the font in the text area.
No use filter	Displays the contents of the SEM image observation-condition file that corresponds to the SEM image file, just as they are. Select this item before dragging an image from the index-image screen. If this item is not checked, the text filter feature is enabled. ※ Even if the No use filter command is not selected, the functions of the text filter do not work when **Auto function Setup** of the **Tool** menu is not selected.

6.4.2.c Functions available by right-clicking on label

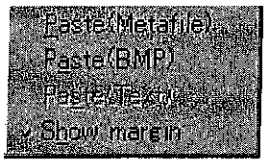
When you press&tap (touch&hold) on the label, a menu appears as shown in Fig-35. The explanations of the functions are given below.



Name	Description
Copy	Copies the selected text region, and then saves it on the clipboard.
Paste	Pastes the text saved on the clipboard in the text area.
Text editor	Opens the Text Editor dialog box (Fig-24) for editing the label.
To Front	Brings the selected label to the foreground, if the label and image are overlapped. However, the label appears always on the top of the display.
Delete	Deletes the text area.
Position Adjust	Adjusts the position of the text frame, balancing it with image and text frames to its left and above it.
Font	Specifies parameters such as the type and size of the font in the text area.
Alignment	Centers the text in the label. Removing a check aligns text to the left.
Select Back	Changes the background of the label to white or transparent.

6.4.2.d Functions available by right-clicking blank space

When you press&tap (touch&hold) the blank space outside the image area, text area and labels on the layout sheet, a menu appears as shown below.

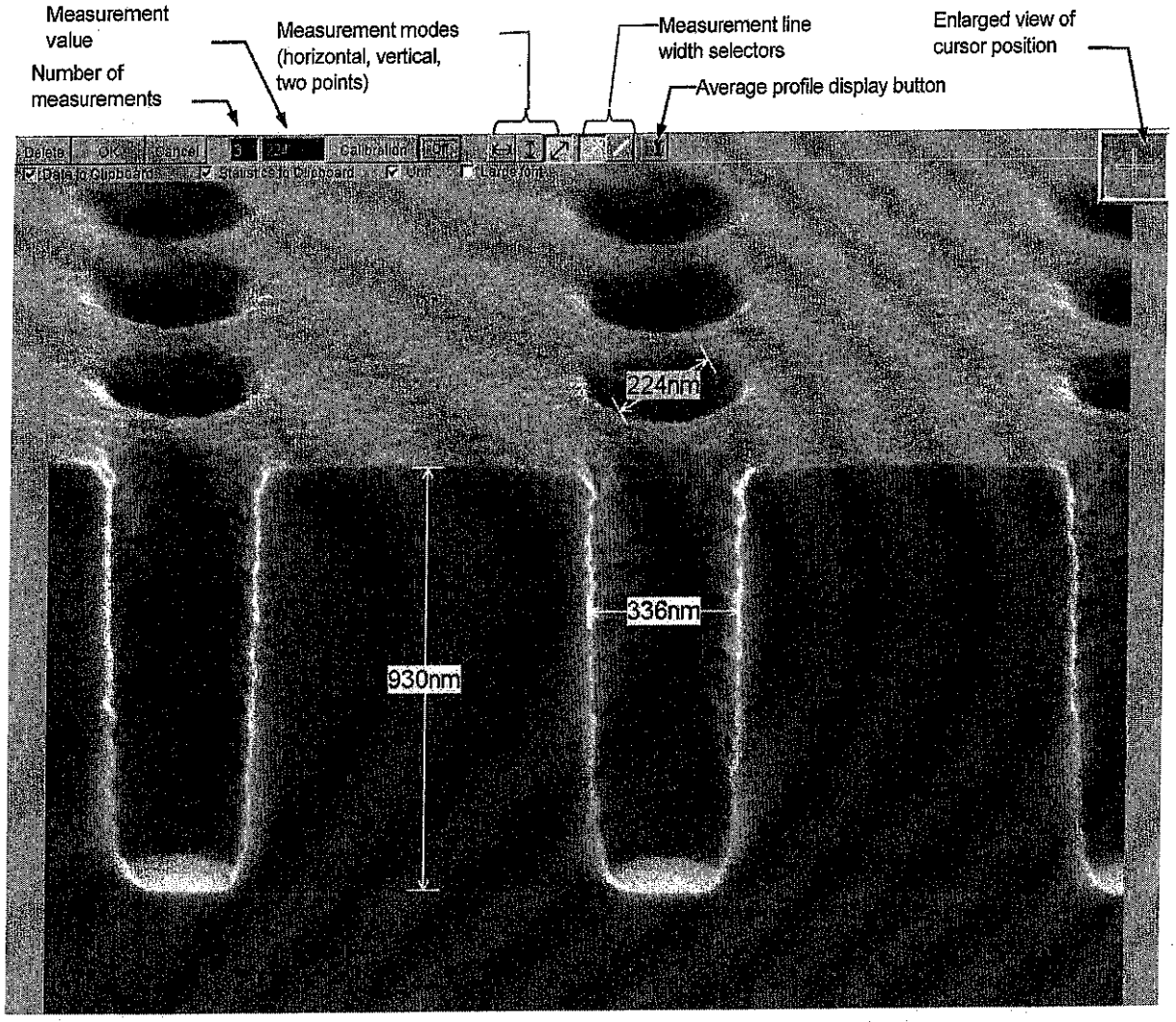


Name	Description
Paste (Metafile)	Pastes the metafile image at the standard photograph size. Click Paste (Metafile) to show a box with a blue dashed line corresponding to the image size. Determine the position of an image by using the mouse, and then right-click the image to finalize its position. This item is available only when a metafile image is stored on the clipboard.
Paste (BMP)	Pastes the bitmap image at the standard photograph size. The operation is the same as that of Paste (Metafile). This item is available only when a bitmap image is stored on the clipboard.
Paste (Text)	This item is available with text in the clipboard. Clicking Paste (Text) displays a blue-dashed box that represents the text area. After determining the position using the mouse, a click shows the text.
Show margin	Sets whether the margin is indicated or not. The margin is the area that cannot be printed. When Show margin is selected, the area that cannot be printed is indicated in green. Areas other than the margin can be printed.

6.4.3 Measurement Function

6.4.3.a Measurement screen

Select the **Measure** command from the menu that appears when you press&tap (touch&hold) on the image of the layout sheet. The screen changes to the one shown below.



The results of measurement are written on the photograph. The average, standard deviation, and other values resulting from measurements at several points are also calculated.

After selecting a measurement mode, drag from the initial point to the final point to measure.

The initial point is the location of the mouse cursor when you press and hold down the left button of the mouse, and the final point is that when you release the button. The distance between the two points is displayed.

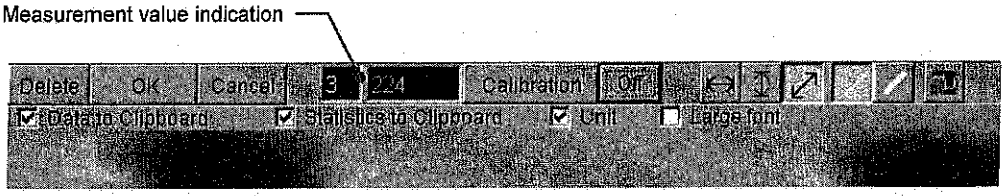
The unit of measurement is the unit displayed below the micron scale on the photograph.

The result of measurement is immediately indicated black numbers on a yellow background. Drag it to any desired position. To redo measurement, select **Delete** from the press&tap (touch&hold) menu or tap the Delete button at the upper left corner of the screen.

6.4.3.b Magnification correction

Magnification correction is possible for better distance measurement. When measurement value is in green, it shows the result of measurement based upon the magnification of photograph. When it is in yellow, it shows the result after measurement correction.

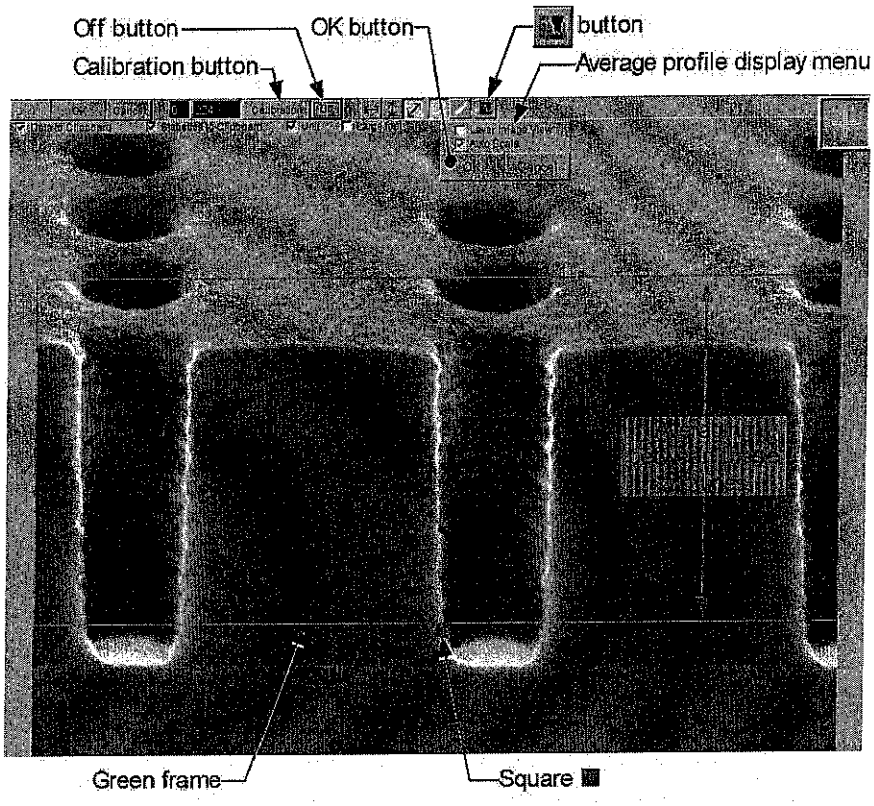
1. Measure the distance between two points as a standard value.
2. Key the standard value into the measurement value indication box, and then tap the Calibration button.
   The numbers change from green to yellow, and also the result indicated with white numbers on yellow is replaced by the standard value on the image screen.



3. Measure a distance that you want.
4. Click the Off button of the screen to turn off the measurement correction.
   The numbers change to green.

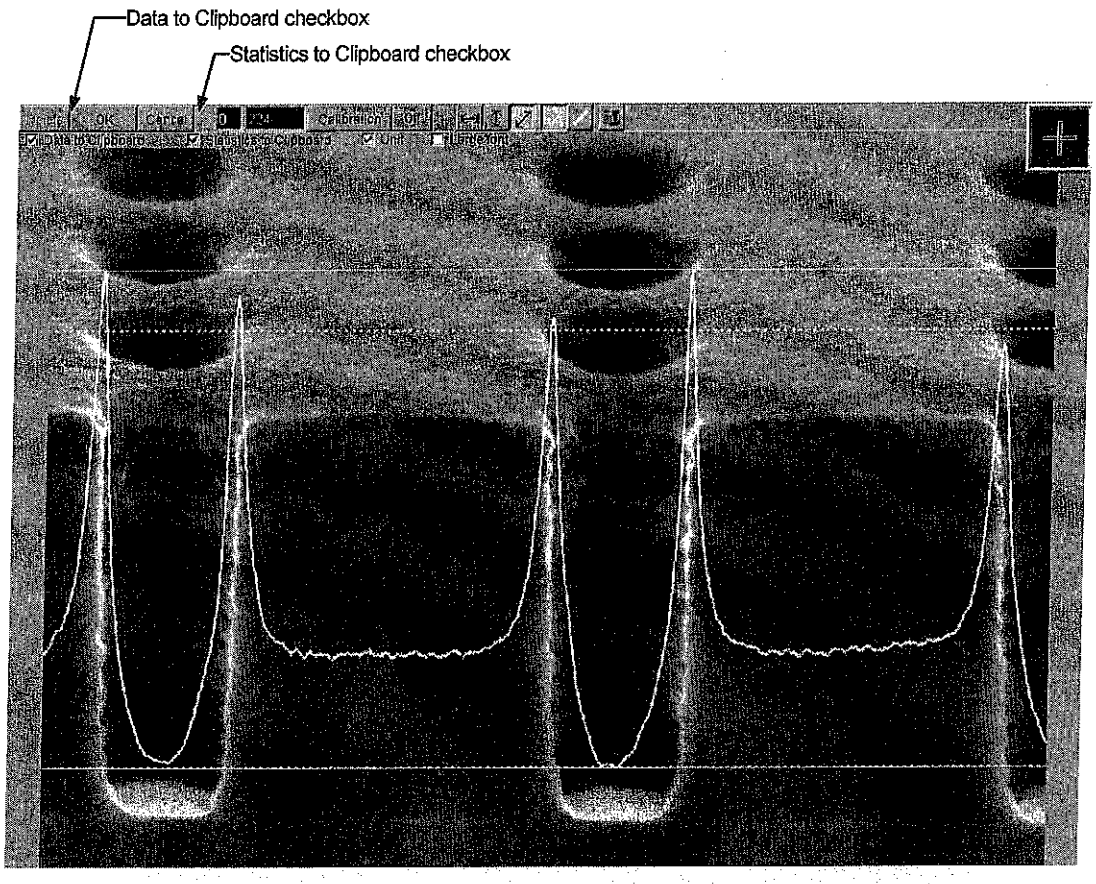
6.4.3.c Average profile display

Clicking the  button displays the average profile display menu and a green frame.
Tapping the OK button graphs the vertically averaged contrast in the green frame.
Dragging the square ■ of the frame changes the region for averaging.



Layer Image View
Displays the green-framed image as the averaged grayscale image.

Auto Scale
If **Auto Scale** has a checkmark, the maximum and minimum values of the average graph reach the upper and lower limits of the frame.



6.4.3.d Data to Clipboard and Statistics to Clipboard check boxes

Measurement results can be copied to the clipboard, after terminating the measurement mode. If you require all measurement values, select the check box next to **Data to Clipboard**. If you require statistics such as the mean, select the check box next to **Statistics to Clipboard**. When both check boxes are selected, perform measurements and tap the OK button to terminate the measurement mode. The following data are examples saved as text.

```
Mean value = 502.7                    }
Standard deviation = 379.8            } Statistical
Number of measurement points          }
= 3
Unit <nm>                             }
331                                   } Measured
938                                   }
```

The contents of the clipboard can be used for statistical treatment or graphing by pasting the contents to the text frame on the layout sheet, or to spreadsheet software.

When the measurement mode is terminated, such results as measurement data and statistics data, other than those on the clipboard, are cleared. However, arrows and measurement values on the image screen remain on the image screen, because they are written as images.

6.4.4 Converting SEM Photographs into Electronic Form and JPEG Images into HTML Documents

6.4.4.a Converting layout sheets into images for attaching to E-mail

When saving the layout sheet, you can save it as a JPEG image in addition to saving it in the standard format.

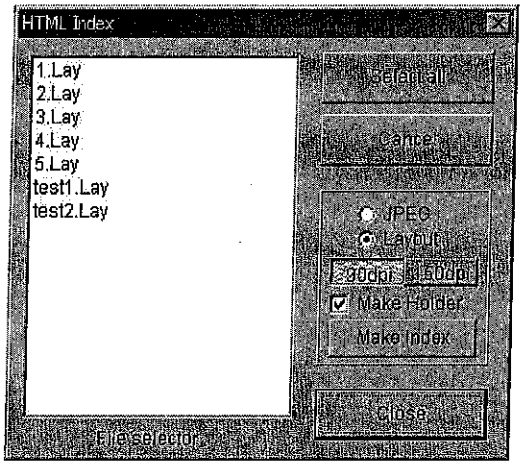
1. Select **Save as** from the **File** menu on the layout sheet.
2. Select JPEG in the Save as type box. After that, key in a file name and then tap the Save button.
   The layout sheet is saved as a JPEG image with data compression after making the layout sheet size appropriate for viewing on the screen of the PC, and so the final size of the file is about 200kB.

   Some image information is lost with JPEG data compression, and it cannot be recovered. If you want to save data without loss of information, save it in .lay format.

6.4.4.b Converting layout sheets into HTML document

By converting layout sheets into HTML format, you can display an index image on a personal computer on which SMile View is not installed. Most of the recent computers can display HTML documents, as browsers such as Internet Explorer and Netscape can open them.

For this conversion, first select **HTML Index** from the **Tool** menu. To load the layout files into an HTML document, the software converts them into JPEG images. Therefore, SMile View can convert an index image that contains JPEG images into an HTML document.



1. Select **JPEG** or **Layout** as the format of the files you want to convert.
   Files in the selected format appear in the **File selector** box. If you select **Layout**, then select **90** or **150dpi** as the resolution for JPEG conversion.
2. Select layout files (JPEG images) in the **File selector** box.
   To select all the files, tap Select all button. To deselect the files, click Cancel.
3. Click the Make Index button.
   This creates files with the extensions Index.htm and File.htm, and files with the extension .idx for each image, in the folder that contains the layout files. At this time, if **Make Holder** has a check, the software creates a new folder named HTML.
4. Load the Index.htm file into an Internet browser.
   The index image of the layout sheet appears. Clicking on a small image enlarges it, enabling you to check details.

All the files saved in the new folder are required in order to display the images of the layout sheet. When copying all of the files, it is recommended to copy the folder that contains them all at one time.

6.4.5 Auto Function

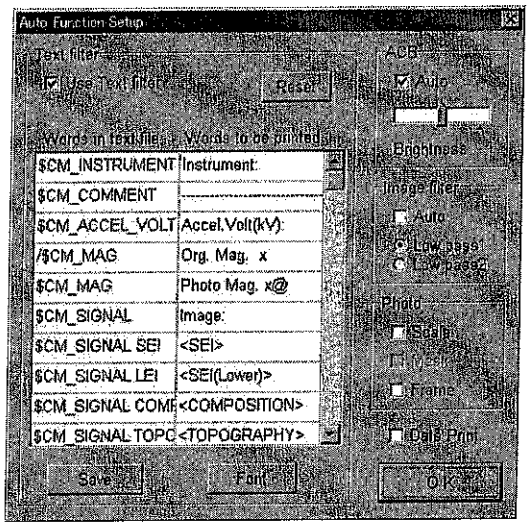
One of the features of SMile View is auto function, which enables you to lay out an image simply by pasting the image on the layout sheet, supported by the several functions of the auto function.

To set up the auto function, select **Auto function Setup** from the **Tool** menu of the layout sheet.

The auto function is as follows:

- Automatic contrast and brightness adjustment (ACB function: Only available for grayscale images; not available for copied images.)
  This automatically adjusts the contrast and brightness of the SEM image.
- Image filtering (Smoothing: Only available for grayscale images, not available for copied images.)
  The roughness of an image is diminished by filtering, so you can see a better image.
- Micron-scale writing (Available only for images with text indication of SEM image observation conditions)
- Text filter
  You can edit the text of SEM image observation conditions for a better appearance.

6.4.5.a Auto Function Setup Dialog



<Text filter>

Use Text filter

Allows you to convert keywords, which are contained in the text of SEM image observation conditions, to common expressions, which are the character strings displayed in the "Words to be printed" column and their following character strings up to the end.

- The @ mark of **Photo Mag.** ×**@** in the "Words to be printed"
  With this @ mark, magnification correction is carried out, taking into account the size of the space for pasting the photograph, when magnification data are rewritten. Furthermore, numerical data are converted to integers, and when items other than magnification, such as accelerating voltage, are selected, conversion to integer format is carried out.
- The text filter does not work with text containing the slash (/) in the "Words in text file" column. To use the filter on text file that starts with a slash in the Words in text file column, first remove the slash.

Save

Saves the contents of the text filter that is used when opening SMile View. The contents of the text filter are saved in the layout sheet, and they are used with higher priority.

Font

Selects the typeface to be used in the text filter.

<ACB>

Auto checkbox

When the command is selected, the automatic contrast and brightness adjustment (ACB) function works in the same way as ACB selection on the layout sheet.

Brightness

Enables you to select Dark, Standard or Bright during operation of automatic contrast and brightness adjustment.

<Image filter>

Auto

When Auto is selected, the smoothing filter previously set operates. You can select between two smoothing levels.

<Photo>

Scale

If there is a text frame linked with the image, a micron scale is written on photograph image, according to the magnification information in the text frame.

Mask

When this is selected, one line of space under the image can be covered with a white mask.

Frame

When an image (other than a metafile image) is pasted on the layout sheet, the image is framed.

<Date Print>

When the layout sheet is pasted, the date is printed at the left bottom with this function.

6.4.6 Useful Hints for Use

6.4.6.a Saving layouts for frequent use on the desktop

A layout sheet file with the extension .Lay can be opened by dropping it on the layout sheet, and so it is recommended to place the layout file on the desktop for easy opening by dragging and dropping it.

6.4.6.b Putting characters and arrows into photograph

The labels of the layout sheet can be also shown on a photograph. Right-click on the label to open the menu, and then select **Select Back**.
To draw marks such as arrows, select **Symbol** from the **Tool** menu to open the Symbol dialog box.
The symbols in the dialog box can be pasted on the layout sheet by dragging and dropping them.
Since they are extension metafile images, their size can be changed like other images.

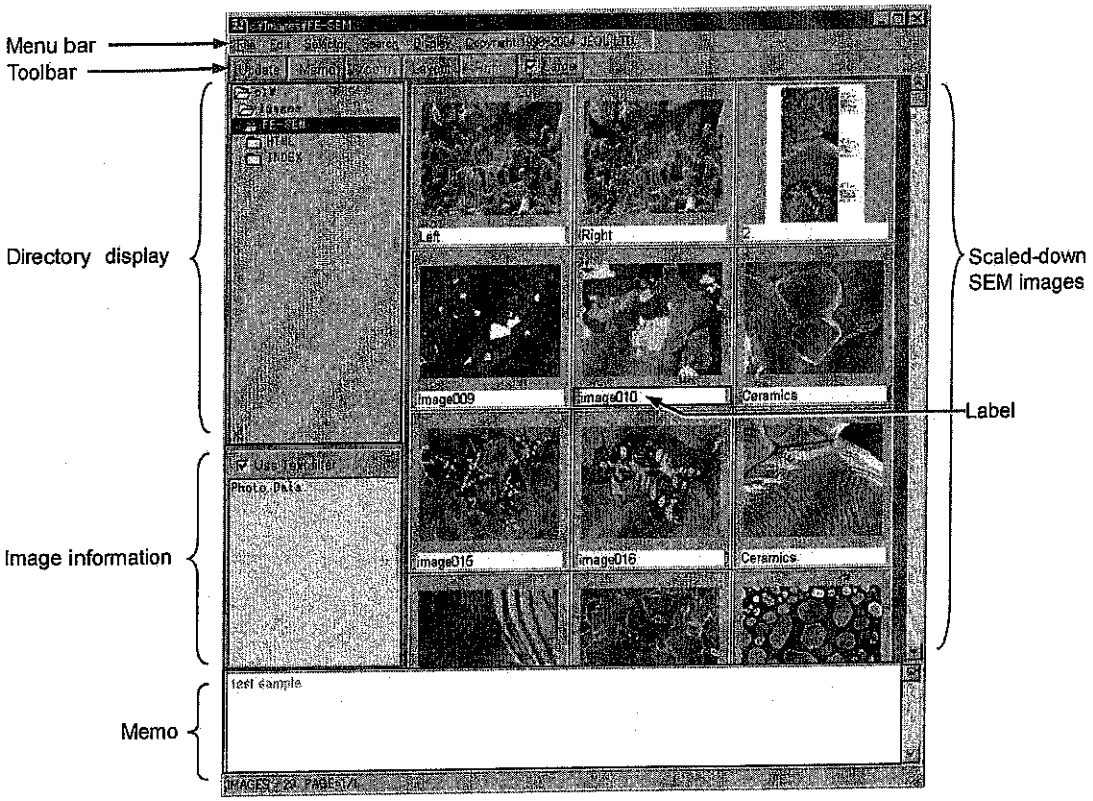
6.4.6.c Adding symbols you created

By saving image files (such as metafiles and bitmaps) in the folder named PARTS in the folder C:\Program Files\jeol\smv, which contains the SMile View application, you can use them as symbols in the layout-sheet window. It might be convenient to create your company logo.

6.5 INDEX-IMAGE SCREENS

SMile View has basic screens such as an index-image screen, a magnified-image screen and a layout-sheet screen. This chapter explains the basic SMile View screens.

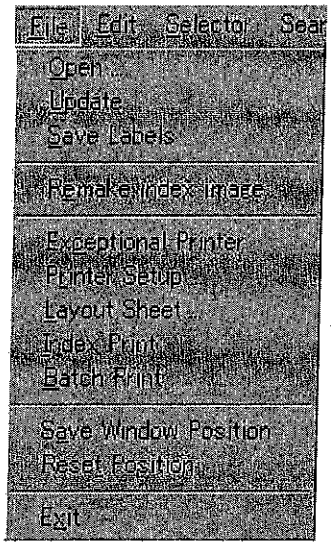
- The SEM images stored in a specified folder are shown scaled down in an index-image screen. The scaled-down SEM images maintain good quality as SEM images.
- You can display up to 50 scaled-down images at a time. If the folder contains 51 or more image files, the Page select button appears.
- Every image is accompanied by a label in which you can put a comment. All the labels can be stored as Label. txt files in the same folder as the image data.
- Tapping a scaled-down SEM image in the index-image screen selects the image; the frame of the image changes to blue. If you click the selected image again, the frame returns to gray and the image is deselected.
- Clicking the Zoom button while a scaled-down SEM image is selected, or double-clicking the scaled-down SEM image, shows the scaled-up image on the display. For information on image enlargement, refer to 6.3.4, "Magnified Image Screen."

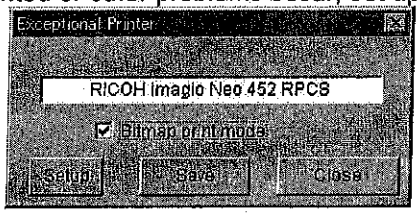


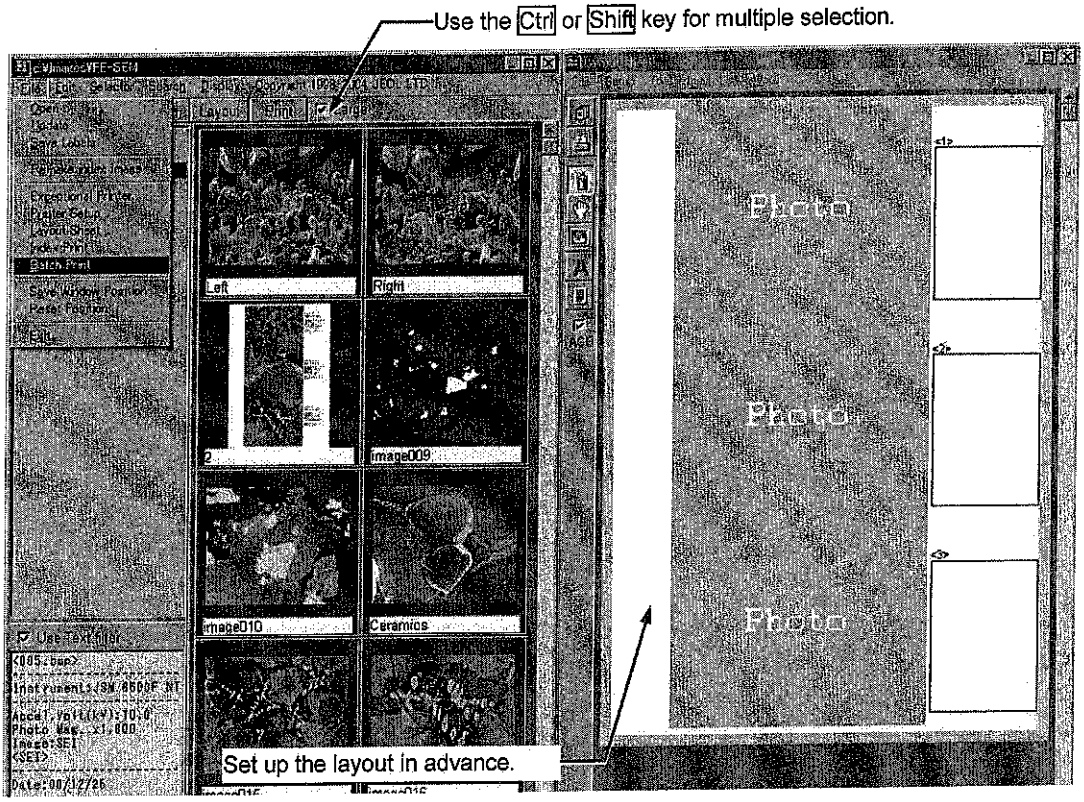
The index-image screen has a menu bar, toolbar, and directory display. The following are explanations of their functions.

6.5.1 Menu bar

6.5.1.a File menu

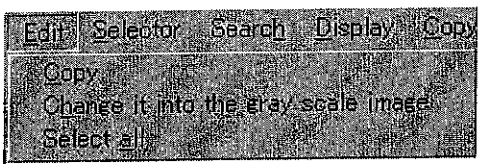


Name	Description
Open	Shows the SEM images in the specified folder. At the same time, an index folder is made in the specified folder. The scaled-down SEM image data are stored in the index folder.
Update	Overwrites the SEM image stored in the specified folder and displays the updated image.
Save Labels	Saves the labels you changed. By default, the filename of a SEM image is used as its label; you can change a label to the specimen name or anything you want. Saving labels creates a Label. txt file in the same folder that contains the images. Changing labels, however, does not change the filenames of the SEM images (labels are saved automatically).
Remake index image	When you have changed the number of colors in the display, selecting Remake index image remakes the scaled-down SEM image data.
Exceptional Printer:	If you save a printer setting with **Bitmap print mode** selected, printing data using that printer creates and prints the BMP image of the overall layout. With normal settings, if some parts are not printed or other problems occur, set up each printer. 
Printer Setup	Changes printer settings such as paper size and page layout.
Layout Sheet	Opens the layout sheet screen for layout editing.
Index Print	Performs the index printing of the scaled-down SEM images in the index-image screen.
Batch Print	Performs continuous printing of the specified SEM images in the index-image screen. To select multiple images, click on them while holding down the Ctrl or Shift key. With the layout sheet set up, the selected images are printed according to that layout. Simultaneously, the labels and text data of the images are also printed according to the layout. In the below figure, the nine image files selected (and framed in blue) in the index-image screen are printed, three images at a time, according to the layout. If the layout sheet is not set up, the specified SEM images are printed at the largest size possible for the paper size, at the given aspect ratio (the paper direction is changed automatically).



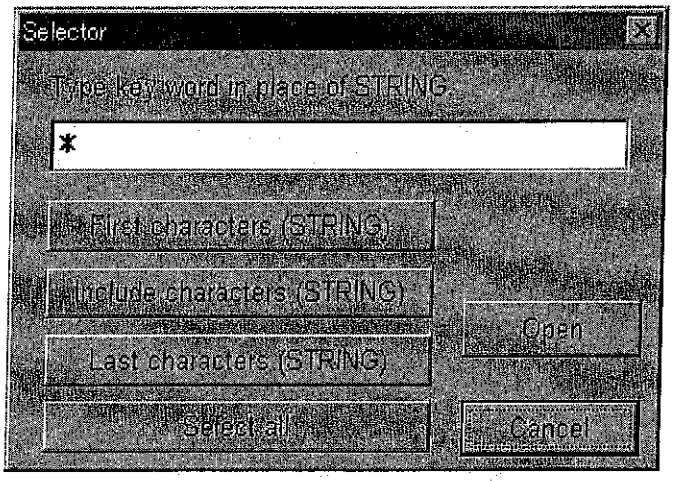
Save Window Position	Saves the window positions of the index-image screen and layout sheet on the display.
Reset Position	Initializes the position data stored using **Save Window Position**. The initialized window positions take effect at the next startup.
Exit	Terminates SMile View.

6.5.1.b Edit menu



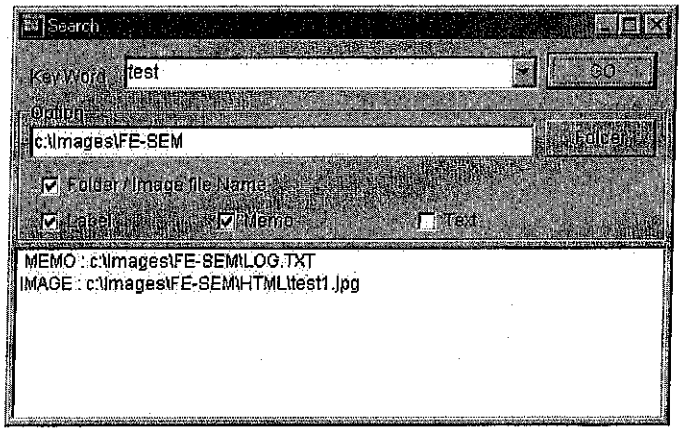
Name	Description
Copy	Copies the selected image from the index-image screen to the clipboard.
Change it into the gray scale image	Converts the selected color image into grayscale, creating a new bitmap image in the folder.
Select all	Selects all the SEM images displayed in the index-image screen.

6.5.1.c Selector menu



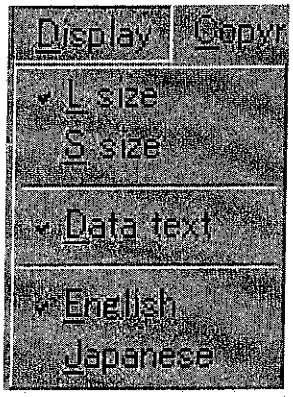
Use a keyword to narrow down the SEM image files to be displayed in the index-image screen. For example, to select filenames that end in "a," tap the Last characters (STRING) button, and then change STRING in the input box to "a" (or enter "*a" directly); as a result, only SEM image files whose filenames end in "a" appear in the index-image screen (the asterisk * denotes any character string).

6.5.1.d Search menu



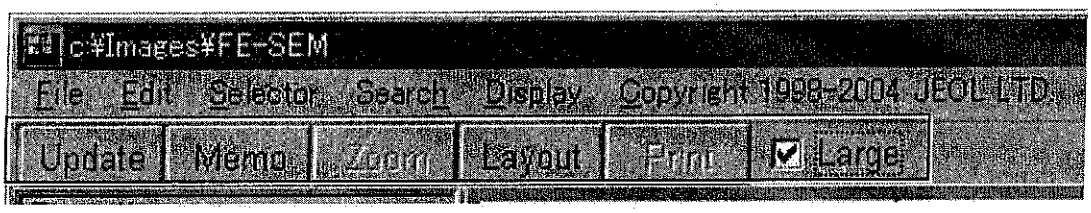
Entering a keyword and tapping the GO button starts searching for the files that contain the keyword. To narrow the search range, enter the folder location directly or select it using the Folder button.
Select **Folder/Image file Name**, **Label**, **Memo**, or **Text** to specify where to search for the keyword (multiple selection possible).
The results of the search appear in the blank field below. If you click on a result, the index-image screen displays all the images in the folder that contains the selected image.

6.5.1.e Display menu



Name	Description
L size, S size	Changes the image size in the index-image screen. Selecting **L size** displays images with 138 × 138 pixels, whereas selecting **S size** displays images with 80 × 80 pixels.
Data text	Putting a checkmark to this item enables the directory-display feature.
English, Japanese	You can select **English** or **Japanese** for display language. ※ On English version Windows, you cannot select **Japanese**.

6.5.2 Toolbar

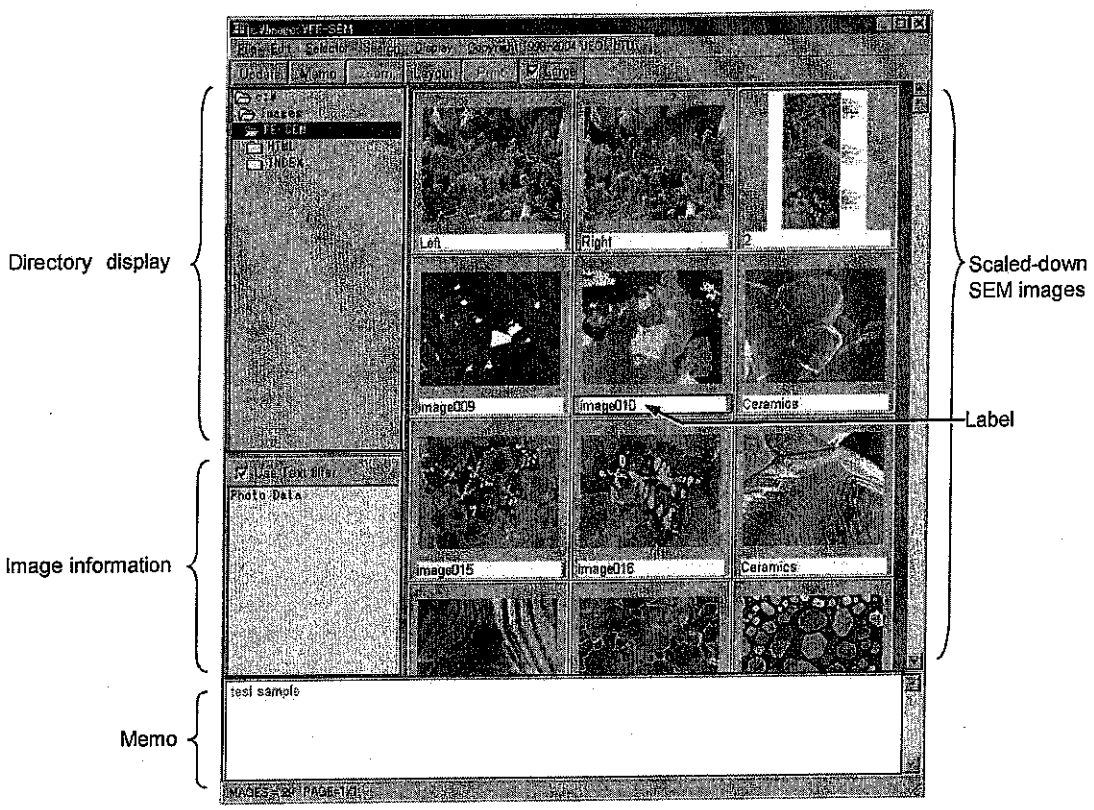


Name	Description
Update	Is the same feature as **Update** in the **File** menu.
Memo	Tap the Memo button to open the Memo dialog box. Memo is the function that records comments on the folder containing SEM images. Tapping the Update button or exiting the application saves the recorded memo as a text file (Log. txt) in the same folder that contains the SEM images. If you write in the memo items in common pertaining to images contained in the folder, you can use them as keywords when retrieving the images.
Zoom	Magnifies and displays the selected scaled-down SEM image
Layout	Is the same feature as **Layout Sheet** in the **File** menu.
Print	Is the same feature as **Batch Print** in the **File** menu.
Large	Changes the size of scaled-down SEM image. When **Large** is checked, the scaled-down SEM image is displayed in L size (138 × 138 pixels).

6.5.3 Directory display feature

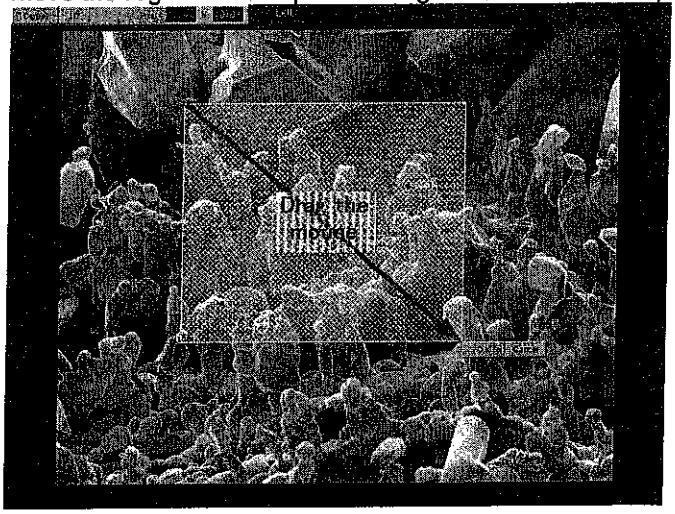
Selecting a folder that contains images displays the images contained in the folder in the index-image screen. Selecting an image in the index-image screen displays information on the image in the blank field under the directory display.

Use Text filter: Putting a checkmark to **Use Text Filter** displays only important information from the text data with the same name as the image file. Without a checkmark, the text data are displayed as they are. Normally, put a checkmark to this item.



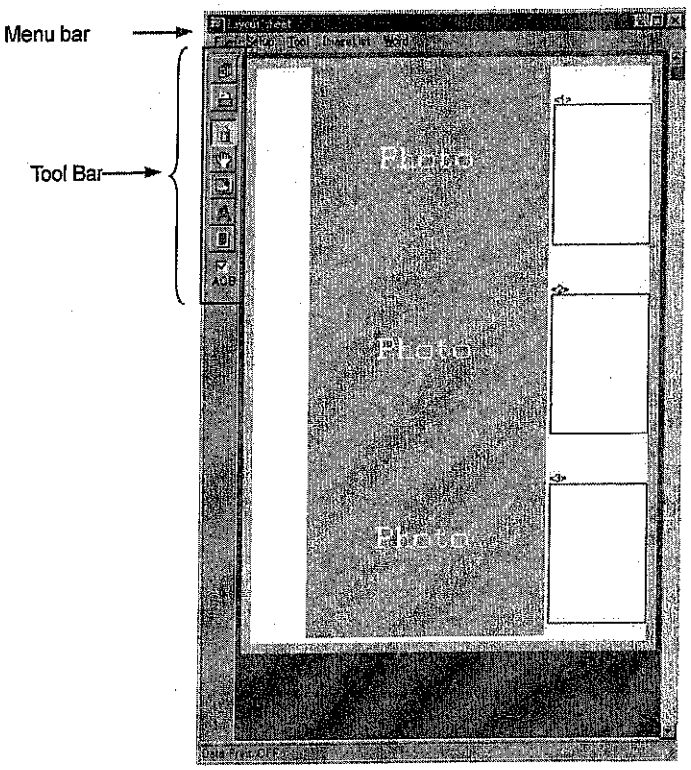
6.5.4 Magnified-Image Screen

Tapping the Zoom button while a scaled-down SEM image is selected on the index-image screen or double-clicking a scaled-down SEM image switches to the magnified-image screen. In this screen, the selected SEM image is displayed on the whole screen of the personal computer. The menu shown below appears in the upper left corner of the magnified-image screen. The rest of this section explains the functions of this menu.

Name	Description
Close	Terminates the magnified-image screen and returns to the index-image screen.
Set Original size	Sets the number of pixels of a SEM image to the dot size of the screen to magnify the SEM image. Some display types do not allow you to observe the whole SEM image due to their resolution. When Set Original size is selected, you can drag an image to an arbitrary position in the magnified-image screen.
Set Screen size	Fits the entire SEM image to the display size. With **Set Screen size** selected, tapping Close or tapping in the magnified-image screen terminates the magnified-image screen and returns to the index-image screen.
Back	Magnifies and displays the image immediately preceding the present one in the index-image screen.
Next	Magnifies and displays the image immediately following the present one in the index-image screen.
 button	The scissors button. Tapping this button changes the pointer to scissors. In the magnified-image screen, dragging the mouse over the region you want to cut and tapping the OK button at the lower right of the frame cuts the selected region to the clipboard. At this time, the numbers of pixels of the cutout region appears at the upper left of the screen. At the same time, the screen capture tool appears, showing the cutout image. You can change the size of the selected region by clicking on the displayed numbers of pixels and entering numbers of pixels using the keyboard. To copy the half size of the image, tap 1/2 button at upper left. Dragging the center of the selected region moves its position.
 button	The fixed-size image capture button. Unlike the scissors button, this button specifies the same region as the last time. Use this button to capture images in the same region in the same size continuously. Also, as with the scissors button, you can change the numbers of pixels and move the region. The captured image is stored in the clipboard. 

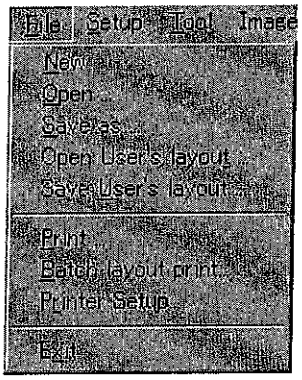
6.6 LAYOUT-SHEET SCREEN

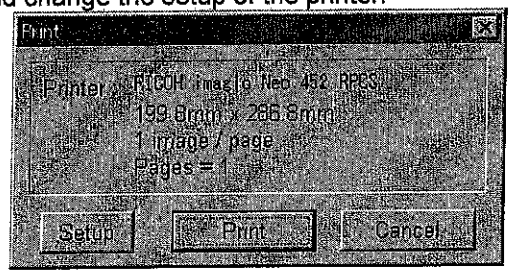
You can easily lay out, print and save SEM images, observation conditions and other information in the layout sheet.
The magnification indication of SEM images is calculated based upon the photograph size (which is set in the setup screen ☞Fig-2). With reference to the layout-sheet screen, when you paste the scaled-down SEM image displayed in the index-image screen to the layout sheet, the scaled-down SEM image is automatically adjusted to the photograph size and displayed (Fig-13). The observation conditions and label belonging to the SEM image are also pasted near the image.
Furthermore, you can easily paste the image in the clipboard and input text such as a comment.
The menu bar and toolbar are available in the layout sheet. The following explanations are given for each function.



6.6.1 Menu bar

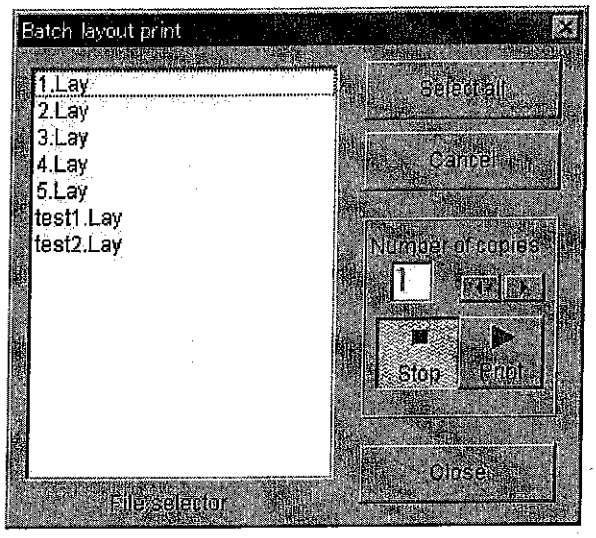
6.6.1.a File menu



Name	Description
New	Clears the layout sheet. When **New** is selected, since all the image data being edited and text data already input are deleted from the screen, be sure to save necessary layout sheets before selecting **New**.
Open	Opens a saved layout sheet. When **Open** is selected, all the layout sheet being edited is also deleted.
Save as	Saves the layout sheet that you have made together with the SEM images and texts such as observation conditions and labels. You can change the file format from the layout format (*.lay), which allows editing, to JPEG (90 or 150dpi, *.jpg) or bitmap (90dpi, *.bmp). The entire layout sheet can be stored as a single image. When a layout sheet is saved as JPEG, it becomes about a 200KB file, which can be used as an e-mail attachment.
Open User's layout	Opens a user's layout that is set up and stored in advance. In the user's layout, you can set up the image area and text area as you like, and add marks such as company logos. For information on how to set up the user's layout, see Section 6.1, "User's Layout."
Save User's layout	Saves the user's layout you set up. It is stored in C:¥program Files¥jeol¥smv by default. Unless you save the layout in this location, it does not appear in the list that is displayed by selecting **User's Layout** from the **Setup** menu. When you have made a layout sheet to your liking, it can be saved as a user's layout. However, Save User's Layout saves only its formats. To save it together with the image data, right-click the image area and select **Keep image** (repeat this procedure for each image).
Print	Shows the Print window. With the Print window, you can perform printing and change the setup of the printer.  Tapping the Print button prints the layout. Tapping the Setup button displays the Printer setup window, where you can make settings such as the paper size and print direction; for details, see the manual for your printer. Tapping the Cancel button stops the printing.

Batch layout print

Lets you print a batch of layout sheets. Selecting **Batch layout print** displays the Batch layout print window as shown below. Basically, this dialog box shows the layout-sheet files contained in the working folder of the index-image screen.



If you want to change the folder for batch printing, open a .Lay file contained in your desired folder by selecting **Open** from the **File** menu, or drag and drop it onto the SMile View icon.

Name	Description
How to select layout-sheet files individually	To select a layout-sheet file individually, click the layout-sheet file that you want. The selected layout sheet is shown in blue. To select additional layout sheet files, click them while holding the Ctrl key. To deselect some specific selected layout-sheet files out of them, click the specific layout sheet files while holding the Ctrl key.
Select all	Clicking the **Select all** button selects all of the layout sheets shown in the Batch layout print dialog box.
Cancel	Clicking the **Cancel** button deselects all the selected layout sheets.
Number of copies	Tapping the arrow button sets the number of copies for printing. Setting of 1 to 99 copies is possible.
Print	Clicking this starts printing. The layout-sheet files whose printing has finished are deselected and return to the original color.
Stop	Clicking this stops the printing. To resume printing, tap the Print button again.

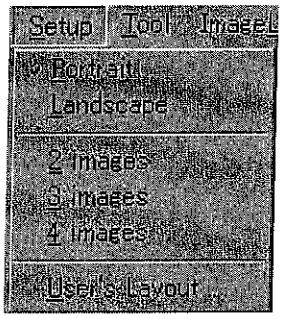
Printer Setup

Lets you make settings such as the paper size and print direction. For details, see the manual for your printer.

Exit

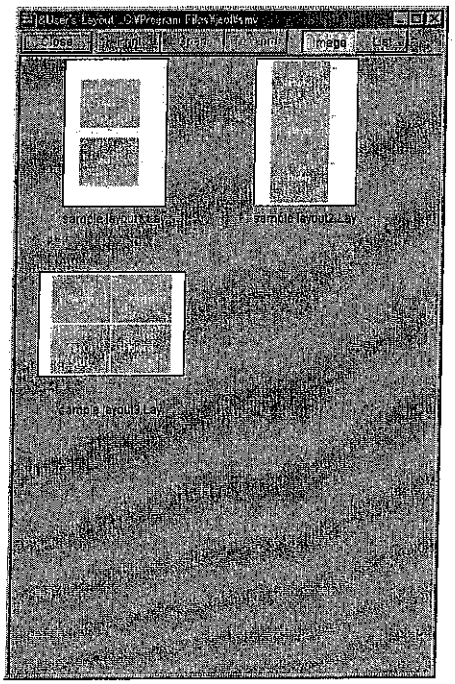
Terminates layout sheet. Nevertheless, the layout sheet under editing remains in memory until the SMile View program is terminated.

6.6.1.b Setup menu

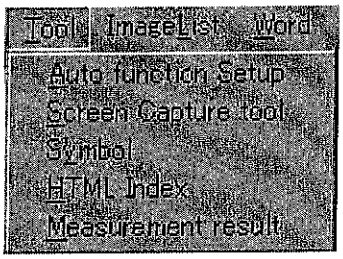


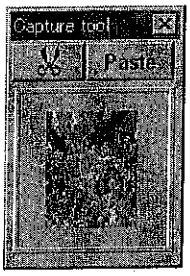
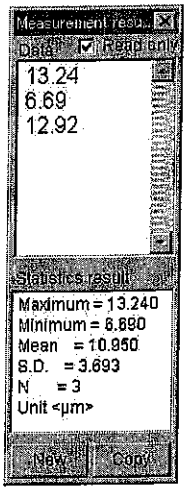
Name	Description
Portrait	Sets the layout sheet in the vertical direction. When the printer is set to the vertical direction in Printer Setup, Portrait is automatically selected.
Landscape	Sets the layout sheet in the horizontal direction. When the printer is set to the horizontal direction in Printer Setup, Landscape is automatically selected.
2 images	Allows you to paste two SEM images, observation conditions and labels at a predetermined position on the paper. It is also possible to add such things as arbitrary text.
3 images	Allows you to paste three SEM images, observation conditions and labels at a predetermined position on the paper. It is also possible to add such things as arbitrary text.
4 images	Allows you to paste four SEM images and labels at a predetermined position on the paper. However, the observation-condition area is not shown. It is also possible to add such things as arbitrary text. The direction of the layout sheet automatically becomes horizontal.
User's Layout	Opens the User's layout window such as shown in the next page. User's layouts must have been saved in advance with **Save User's layout**.

The User's layout window displays the layout sheets contained in C:\Program Files\jeol\smv. Therefore, save user's layouts in this folder.
As for the method of making the user's layout, refer to Section 6.6.1, "User's Layout."



6.6.1.c Tool menu

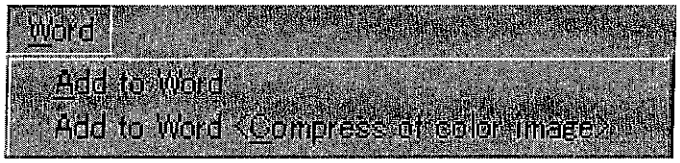


Name	Description
Auto function Setup	Allows you to set the text filter, automatic contrast and brightness (ACB), image filter, and photograph. ⇒ For details, see Section 6.6.5.
Screen Capture tool	Lets you copy everything on the Windows screen. As with the scissors button in Section 4.2, "Magnified-Image Screen," you can select a region by dragging the scissors pointer. Also, with a bitmap image in the clipboard, tapping the Paste button pastes it into the screen capture tool. You can paste the image from the screen capture tool onto the layout sheet by drag and drop. The image and color quality in printing differ from the actual quality on the screen depending upon the resolution and color palette of the display. Use this tool to paste data such as EDS analysis results other than the SEM image (BMP image or JPEG image), at the same time. 
Symbol	Symbols such as arrows can be pasted on the layout by using drag and drop. Selecting **Symbol** displays images; you can add any images to them. ⇒ For details, see Section 6.6.5
HTML Index	Allows you to make HTML files by compiling saved layout files and JPEG image files. You can display the index images of layouts for viewing with Internet browser software. ⇒ For details, see Section 6.6.4.
Measurement result	Selecting **Measurement result** opens the Measurement result panel such as shown in the next page. With the Measurement result panel open, performing a measurement automatically pastes the results of measurement or the results of statistical calculation into the Measurement result panel. At this time, the results are pasted into the Measurement result panel, regardless of whether **Data to Clipboard** or **Statistics to Clipboard** in the Measurement screen has a checkmark. However, with the Measurement result panel closed, the results of measurement are not applied to that panel. The results of measurement are pasted into the upper field of the Measurement result panel. If the **Read only** checkbox has a checkmark, you cannot rewrite the results of measurement. The lower field of the Measurement result panel displays the maximum value, minimum value, average value, and standard deviation of the measured data, number of measurement points, and unit of measurement. Rewriting the results of measurement in the upper field updates the statistical results in the lower field. Tapping the New button clears all the results of measurement. Tapping the Copy button copies data from the Measurement result panel to the clipboard. 

6.6.1.d Image List menu

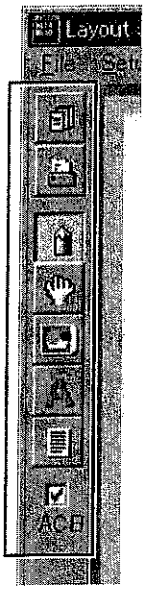
The Image List button allows selection between Minimization and Original size in the index-image screen. The minimization button of the index-image screen facilitates minimizing of all the SMile View windows.

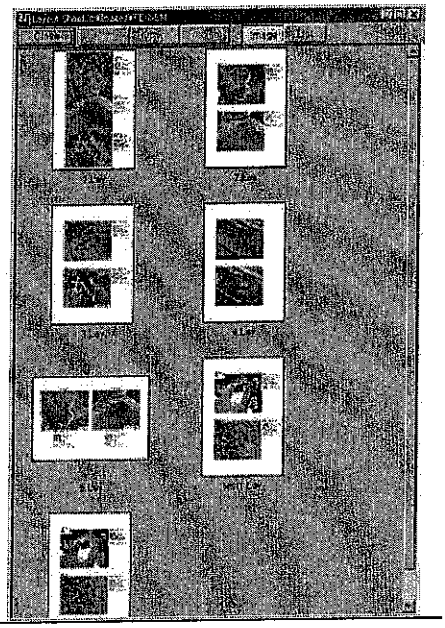
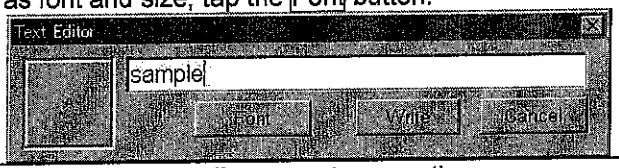
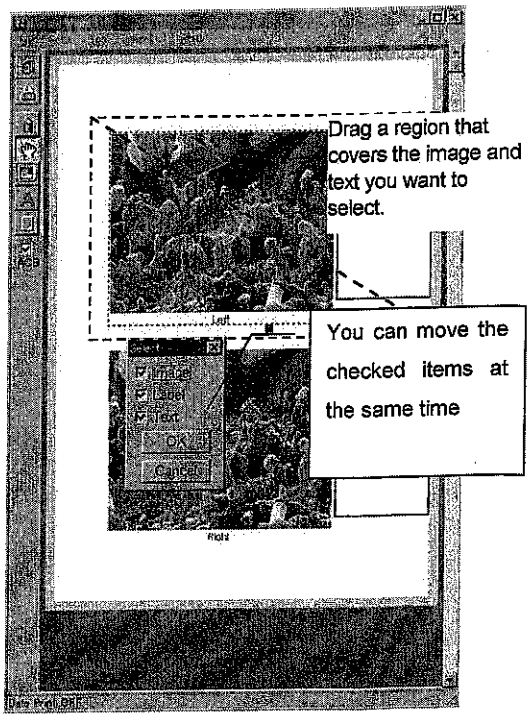
6.6.1.e Word menu



Name	Description
Add to Word	Adds the displayed layout sheet to the open Microsoft Word file. If no Word file is open, a new file is created.
Add to Word < Compress of color image>	Compresses the color images in the layout in JPEG format, and adds them to Word. Metafile images are not compressed. Compressing EDS data might blur the boundaries, so it is recommended that you use **Add to Word**, which does not compress data.

6.6.1.f Toolbar



Name	Description
button	The layout index button displays the layout index of layout files saved in the same folder as the image, and allows you to open the designated layout file. Batch layout print is possible by clicking the Print button after selecting more than one layout. You can also add layouts to Word. 
button	The print button displays the Print dialog box.
button	The text edit button allows you to edit the observation conditions and labels and other text on the layout sheet. While holding this button down, click any text area enclosed with a black line on the layout sheet; then you will be able to edit directly the contents of the text area. When characters are too small to see, maximize the size of the window. Click the label; then the Text Editor window as shown below appears. Tap the Write button, after writing comments in the Text Editor window. To set such things as font and size, tap the Font button. 
button	The push button allows you to move the image, text area and label, for example, and to change the size. While this button is selected, tap the image or text area, and then the image or text area is boxed with a blue line. To move the image or text area, drag it to a position that you want. Dragging the blue ■ changes the size of the image or text area. On the layout sheet, the image size and observation magnification are linked to each other, so changing the image size automatically changes the observation magnification and scale size as well. With this button selected, dragging a region enables you to move and resize all the contents in the region including the image and text area. If you want to move and resize only the image, label, and/or text, put a checkmark to the corresponding items in the displayed box. Tapping the Cancel button cancels the change. 

 button	The layout button allows you to create the SEM image layout. After selecting this button, tap the layout sheet; then you are able to make the image area, observation-condition area and label.
 button	The label button allows you to insert the label. After selecting this button, tap the layout sheet; then the Text Editor window opens. A comment line in addition to the label text of the index-image screen can be pasted on the label on the layout sheet. Since the background of the label on the layout sheet can be changed to colorless to make it different from the text area, such as comments is pasted without covering the SEM image except with the strokes of the characters.
 button	The text button allows you to make a text area. One or more comment or memo lines can be displayed in the text area. When layout sheets are printed, the frames of text areas are not printed.
 switch	The ACB switch allows you to switch the Auto Contrast/Brightness (ACB) on or off. While this switch is checked, the SEM images on the index-image screen can be pasted on the layout sheet, with automatic adjustment of the contrast and brightness of the image (only for grayscale images).